

Appendix A

**Letter dated May 24, 2002 from John H. Roburtus,
California Regional Water Quality Control Board to
Donald Weaver, Duke Energy South Bay**

California Regional Water Quality Control Board

San Diego Region

Internet Address: <http://www.swrcb.ca.gov/rwqcb9>
9174 Sky Park Court. Suite 100. San Diego. California 92123

Phone (858) 467-2952 FAX (858) S71-6972

May 24, 2002

**CERTIFIED-RETURN RECEIPT REQUESTED
7099 3220 0005 6494 7328**

Mr. Donald Weaver
Plant Manager
Duke Energy South Bay, LLC
990 Bay Blvd.
Chula Vista, CA 91911

Dear Mr. Weaver:

REQUEST PURSUANT TO CWC 13267 FOR STUDIES TO ASSESS THE IMPACT OF INTAKE STRUCTURES, AND DISCHARGE FROM SOUTH BAY POWER PLANT ON SOUTH SAN DIEGO BAY

On May 4, 2001, Duke Energy submitted an application for renewal of NPDES Permit No. CA0001368. Order No. 96-05 expired on November 14, 2001. Tentative Order No. 2001-283, renewing the NPDES permit for Duke Energy, South Bay Power Plant (SBPP), was initially Considered by the Regional Board at a public hearing on December 12, 2001. During the December 12, 2001 public hearing the Regional Board heard oral testimony, but decided to delay action on the tentative Order until a future meeting.

Staff considered all written and oral testimony provided by the public and various environmental resource agencies regarding tentative Order No. 2001-283. The tentative Order was assigned a new Order number (No. R9-2002-0022) and incorporated a number of revisions based on comments received prior to and during the December 12, 2001 hearing. Tentative Order (No. R92002-0022) also included additional monitoring requirements and special studies necessary to fully assess the impacts of the South Bay Power Plant discharge on the ecosystem in south San Diego Bay. Tentative Order No. R9-2002-0022 was mailed out for public comment on March 22, 2002

Based on a review of additional ambient water quality data for south San Diego Bay and further consultations with resource and regulatory agencies, including the U.S. Fish and Wildlife Service, the California Department of Fish and Game, and the U.S. EPA, staff has concluded that that previous studies conducted by the discharger to assess the impact of the intake structures and discharge on water quality objectives and the designated beneficial uses of south San Diego Bay and verification of compliance with Sections 316 (a) and 316 (b) of the CWA do not fully represent existing conditions in south San Diego Bay and operational parameters at SBPP. Because of the need for current data, the Regional Board will defer consideration of a reissued permit to a future date.

Pursuant to Section 13267, I am directing Duke Energy to conduct six studies to assess the impact of the intake structures and the discharge from, the South Bay Power Plant (SBPP) on the biological resources and beneficial uses of south San Diego Bay and to verify compliance with Sections 316(a) and 316(b) of the Clean Water Act (CWA). The critical issues and rationale for conducting these studies is included in Section

A of this letter. The descriptions of the six required studies are included in Section B of this letter. The schedule for the planning, initiation, and completion of the studies and the timelines for submittal of the associated work plans, progress reports, and final technical reports are detailed in Section C of this letter.

A. CRITICAL ISSUES

A.1 Compliance with Section 316(a) of the Clean Water Act (CWA)

Section 316(a) of the CWA requires that States impose an effluent limitation with respect to the thermal component of a discharge (taking into account the interaction of such thermal component with other pollutants), that will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on that body of receiving water.

In 1972-73 a thermal effects study was completed, on behalf of the discharger, to investigate compliance with the State Thermal Plan and CWA Section 316(a). Evidence from both intertidal and subtidal sampling suggested that elevated water temperatures caused by the thermal discharge had adverse impacts to bay organisms that inhabited the cooling water discharge channel, particularly in late summer and early autumn. These effects were much reduced during the winter and spring periods when ambient water temperature dropped and the temperature of the thermal plume reduced. During all seasons, however, the adverse effects appeared to be confined, primarily to the inner portions of the discharge channel. The overall finding was that the thermal effluent from the SBPP had no major adverse effects on the benthic communities beyond the end of the discharge channel.

Subsequent thermal effects studies and monitoring conducted by various environmental and research entities have confirmed the initial studies conducted in 1972-73 by Ford & Chambers.

In 1995 the USEPA reviewed 18 years (1977-94) of annual summer benthic studies and concluded that although the benthic community in the discharge channel typically contains somewhat reduced diversity and abundance of species, the community present there is within the range observed at sampling stations outside the discharge channel, and there have been no appreciable long term upward or downward trends in species diversity or abundance. In 1996 the Regional Board concurred with USEPA's review of the benthic community study and findings of previous Section 316(a) compliance investigation studies. The Regional Board adopted Order No. 96-05 in November 19, 1996, renewing the NPDES permit for SBPP and finding the discharger to be in compliance with Section 316(a) at that time.

Although the permitted thermal limits in effect at the time the previous 316(a) studies were conducted have not changed, the compliance point used for verification with thermal limits was relocated in Order No. 96-05.

A jetty extends from the northern side of the SBPP discharge basin into San Diego Bay, separating the inlet and discharge channels. The width of the SBPP discharge channel varies from approximately 100 feet (at the property line) to approximately 1,200 feet at its widest point in the Bay. The length of the discharge channel is approximately 5,200 feet. The thermal limit compliance point in the 1970's was located at the end of the jetty separating the inlet and discharge channels. This point was approximately 5,000 feet downstream of SBPP's property line. The designated compliance point for the thermal limits in the existing NPDES permit is approximately 1,000 feet downstream of the SBPP's property line. The compliance point in the 1970's was therefore approximately 4000 feet downstream of the current compliance point. This effectively provided a large dilution zone, allowing the SBPP to dispense more heat to the discharge channel than is possible by the current compliance location.

It is clear from the above studies that there were detrimental impacts from the SBPP discharge on biological communities; within the eastern portion of the discharge channel.

It is evident from the above findings that revised Section 316(a) studies need to be conducted in order to fully address impacts of the SBPP thermal effluent on benthic communities, fish, and aquatic vegetation present in south San Diego Day. The studies must based on current conditions in south San Diego Bay and reflective of existing operational parameters at the SBPP. Furthermore, the revised studies must place special emphasis on the discharge channel.

Following is a list of critical questions that need to be answered to verify compliance of the current SBPP thermal discharge with Section 316(a) requirements:

1. *What are the effects of the cooling water discharge on aquatic and benthic species during the days when water temperature is the highest in the discharge channel? Are these effects permanent or temporary?*
2. *Does temperature, dissolved oxygen (DO), and/or chemical makeup (chlorine, metals, toxicity etc.) have a combined effect on the species abundance and diversity in the discharge channel?*
3. *What portion of the discharge channel does not support beneficial uses due to elevated temperatures? What are the affected species, and do these species exist in other parts of the discharge channel and in south San Diego Bay?*
4. *What is the effect of the discharge on designated endangered species? What are spatial and temporal effects on endangered species populations within the influence of the plant due to the discharge?*

A.2 Compliance with Section 316(b) of the Clean Water Act (CWA)

Section 316(b) of the CWA requires that the location, design, construction and capacity of cooling water intake structures reflect the Best Technology Available (BTA) for minimizing adverse environmental impact. By letter dated October 30, 1977, the Regional Board requested SDG&E to initiate studies to demonstrate conformance with the requirements of Section 316(b) of the CWA.

Studies pursuant to Section 316(b) to assess the effects of impingement and entrainment were conducted in 1979-80 (cooling water intake system demonstration project). The studies evaluated both impingement and entrainment effects by quantifying the species, number of organisms, and life stages affected. Entrainment of invertebrate zooplankton and ichthyoplankton were evaluated for different periods of the daily cycle. Impingement and trapping of fishes and larger invertebrates within the intake structure of the power plant were also evaluated. Both entrainment and impingement were evaluated in relation to tidal cycle and season.

In December, 1980, SDG&E submitted the final results of a cooling water intake system demonstration project for the SBPP intended to comply with Section 316(b) of the CWA. SDG&E concluded that "the low and insignificant level of impact demonstrates that the existing SBPP's intake system represents the BTA for this specific site to minimize adverse environmental impacts."

In September, 1993, the USEPA reviewed and concurred with the 1980 SBPP 316(b) demonstration project results which indicated that marine receiving waters in the vicinity of the SBPP contain viable, self-sustaining populations or communities of organisms and that the plant incorporates BTA intake technologies. In 1996 the Regional Board adopted Order No. 96-05 and accepted the 1980 demonstration project for Section 316(b).

Although the intake structure at SBPP has not been changed since the demonstration project was completed in 1980, staff, after consulting with the USEPA, has concluded that the demonstration study is outdated and needs to be updated. By letter dated March 12, 2002, the California Department of Fish and Game (DFG)

also recommended that the Section 316(b) demonstration study be updated. DFG indicated that the 1980 demonstration study was conducted under much different circumstances than we have today. DFG identified the following reasons why the 1980 demonstration study may no longer be applicable to the SBPP and why a new study is warranted: 1) the intake water flow rates through SBPP during the 1980 studies were below the current permitted level of 601 MGD, 2) the discharge channel was not evaluated as a part of San Diego Bay, 3) the re-circulation of the elevated temperature discharge plume from the discharge channel back into the intake channel was not considered, and 4) the BTA from 1980 to 2002 has changed. By letter dated February 26, 2002, the U.S. Fish and Wildlife Service (USFWS) also recommended that Duke Energy should be required to demonstrate that the BTA is being employed to minimize biological organisms lost by impingement and entrainment.

Following is a critical question that needs to be answered to verify compliance of the-current SBPP intake structures-with Section 316(a) requirements:

Do the location, design, and capacity of the existing cooling water intake structures at SBPP meet the criteria for the best technology available for minimizing adverse environmental impacts, including impingement and entrainment losses, as required by Section 316(b) of the Clean Water Act (CWA)?

A.3 Viability and Distribution of Eelgrass in South San Diego Bay

The Basin Plan lists Marine Habitat (MAR) as one of the designated beneficial uses of San Diego Bay. Eelgrass has been identified among the most productive aquatic plant species in San Diego Bay and is conducive to a diverse marine habitat. By letter dated February 26, 2002, the USFWS, has indicated that the effect of the SBPP discharge on the distribution of eelgrass in South San Diego Bay is of concern. Following is an excerpt from USFWS' letter dated February 26, 2002, regarding eelgrass (p.2):

"Eelgrass is important for many of the species that utilize the Bay. Eelgrass is among the most productive habitats in the ocean and generally associated with diverse invertebrate and fish faunas, both of which serve as prey items for many species of wildlife that utilize south Bay. Therefore, eelgrass serves as a good indicator of a healthy, functioning waterbody. The green sea turtle and brant are known to feed on eelgrass beds within south Bay. Major factors affecting eelgrass distribution include: light levels, temperature, salinity, depth, nutrition, and sediment grain size. We believe the SBPP effluent is a factor affecting the distribution of eelgrass in south Bay because the effluent alters temperature and turbidity in south Bay. We believe the discharge creates disturbance of the bottom sediments, and is likely a greater contributing factor to turbidity, and resulting diminished light levels, in the south Bay than that due to wave action. We would like further evaluation of the effects of the discharge on turbidity in south Bay and the relationship this effect may have on eelgrass distribution."

Based on USFWS recommendation, it is imperative that the impact of the SBPP discharge on eelgrass beds in south San Diego Bay be studied in order to verify compliance with the water quality objectives of the Basin Plan. Previous studies, conducted on behalf of the discharger (*Environmental Controls on the Distribution of Eelgrass (Zostera marina L.) in South San Diego Bay*, Merkel & Associates, 2000), to investigate the eelgrass distribution in south San Diego Bay did not consider the direct impacts of turbidity and elevated temperatures contained in the SBPP discharge on eelgrass distribution in the discharge channel and other areas of south San Diego Bay. A revised eelgrass study is hence needed to investigate this issue.

The following questions need to be answered in evaluating the impact of SBPP on eelgrass survivability and distribution in the discharge channel and other areas of south San Diego Bay.

1. *Does the discharge volume and velocity from SBPP contribute to the generation of turbidity due to disturbance of bottom sediments?*
2. *Does the SBPP discharge move or redistribute the turbidity caused naturally by wave or wind action?*
3. *What is the impact of the turbidity generated and redistributed by SBPP on the survivability and distribution of eelgrass in south San Diego Bay?*
4. *Does the combined impact of turbidity and temperature impact eelgrass distribution and survivability?*

A.4 Impact of Thermal Discharge on Dissolved Oxygen (DO)

The Basin Plan lists Marine Habitat (MAR) as one of the designated beneficial uses of San Diego Bay. Dissolved Oxygen (DO) is a good indicator of the overall health and viability of fish species and other marine communities. Historic temperatures up to 95 or 96 degrees F have been measured at the eastern end of the SBPP discharge channel during summer months. Under extreme conditions of elevated temperature and lowered DO, fish and other mobile organisms could lose the ability to find cooler waters and could become trapped in the cooling water discharge channel. Recent fish surveys indicate a diverse community of certain species of fish now resides in the outer portions of the discharge channel during winter months, however, there is a notable reduction in species diversity, abundance and biomass during summer months.

Staff, in consultation with the US. Fish and Wildlife Service and the California Department of Fish and Game, has concluded that a DO receiving water limit for south San Diego Bay is necessary to ensure protection of beneficial uses. In the absence of valid water quality objectives and conclusive studies regarding DO in south San Diego Bay, there is the need to conduct a study to assist in determining an appropriate site specific numerical DO water quality objective, for the discharge channel and south San Diego Bay. The needed study should investigate the reduction of ambient and saturated DO levels in the discharge channel and south San Diego Bay due to the thermal discharge from SBPP. Furthermore, the study should investigate the impacts of the reduction in DO on the biological resources and beneficial uses of the Bay.

The following questions need to be answered in evaluating the effect of SBPP discharge on DO levels in south San Diego Bay and subsequent impact on the beneficial uses:

1. *Does the heating of water in the discharge channel reduce ambient and saturated DO concentrations to levels that could impact the fish and other biological resources in the discharge channel?*
2. *Is there a minimum DO level necessary to protect fish and other biological resources in the inner portions of the discharge channel?*

A.5 Compatibility of Discharge with the Goals of the South San Diego Bay National Refuge

Due to the biological diversity and abundance of fish and wildlife species, the US. Fish and Wildlife Service (USFWS) recently obtained a long-term lease from the State of California to manage the salt ponds and marine waters in certain portions of south San Diego Bay. The area of San Diego Bay leased by the USFWS includes the salt ponds (in the southern most section of San Diego Day) and extends to mouth of the Sweetwater River in the north (see Attachment 1). The USFWS has designated this area as the South San Diego Bay Unit of the San Diego National Wildlife Refuge (NWR). The SBPP discharge channel resides within the boundaries of the NWR, just north of the salt ponds. It is therefore appropriate that Duke Energy investigate the impact of the thermal discharge on the NWR.

The critical question that would have to be answered regarding this issue would be:

Is the presence of thermal discharge compatible with the goals and objectives of the South San Diego Bay National Wildlife Refuge?

A.6 Potential Impact on Beneficial Uses Due to Future Termination of Discharge

The SBPP has been in operation since 1960. Over four decades of continuous operation and discharge of thermal effluent has contributed to the development of an ecosystem in all or part of south San Diego Bay that has probably acclimatized itself to the elevated temperature regime, particularly in the discharge channel. Any future termination of discharge or modification of SBPP operational parameters may impact the ecosystem and effect the marine communities currently residing in the discharge channel. In light of apparent plans to reduce or terminate power production at SBPP, it is necessary that Duke Energy be prepared to initiate an investigation to identify impacts on the biological resources of south San Diego Bay, at least two years prior to any future reduction and/or termination of its cooling water discharge.

A question to be answered regarding this issue would be:

What would-be the effect of significantly reducing and/or terminating the discharge on the beneficial uses and maintenance of a balanced indigenous population offish, shellfish, and wildlife in south San Diego Bay?

B. Description of Studies

I am requesting that Duke Energy South Bay, LLC, conduct the following studies to, at a minimum, address the water quality objectives and beneficial use issues and associated critical questions listed in Section A of this letter. The study descriptions provided in Section B, should be used as a starting point, and minimal guidance, for the development and submittal of Workplans for the studies:

B.1 Updated Discharge Impact Assessment Study for Compliance with Section 316(a) of the Clean Water Act (CWA)

The discharger shall perform a special study to address the ability of the south San Diego Bay area affected by the discharge from the SBPP to support a balanced indigenous population of fish, shellfish, and wildlife in that area. The area of concern shall include the discharge channel outside the power plant property line, and the remainder of the South Bay affected by the discharge. The study shall address the chemistry and toxicology of sediment and water column and benthic communities. At a minimum, physical and chemical measurements will be taken weekly during July though September to address the periods of greatest heat stress imposed on the biota. Analyses will include chemicals found in the discharge as well as physical and chemical measures of sediment and water related to maintenance of biotic populations. The choice of sampling and analytical methods will depend on the species being evaluated. Special consideration shall be given to protecting food and forage species utilized by endangered species, such as the western snowy plover, light-footed clapper rail, California least tern, California brown pelican, and green sea turtle. The study could supplement the findings of previous studies such as the South Bay Power Plant Cooling Water Discharge Channel Fish Community Characterization Study (Merkel & Associates, 2000) and reports of other investigations. Furthermore, the discharger may utilize the discharge and receiving water monitoring data collected, as part of Monitoring and Reporting Program No. 96-05, in conducting this study.

B.2 Section 316(b) CWA Updated Comprehensive Demonstration Study - Intake Structures

The discharger shall conduct a Comprehensive Demonstration Study (Study) to characterize impingement and entrainment mortality, the operation of cooling water intake structures, and to confirm that the

technologies, operational measures, and/or restoration measures selected and/or implemented at the cooling water intake structure meet the Best Technology Available (BTA).

On February 28, 2002, the USEPA approved a proposed regulation for Section 316(b) of the Clean Water Act, for existing facilities. This proposed regulation, 40 CFR Part 125, Subpart J, *Requirements Applicable to Cooling Water Intake Structures for "Phase if Existing Facilities Under Section 316(b) of the Act,* establishes location, design, construction and capacity standards, for cooling water intake structures at existing power plants that use the largest amounts of cooling water (i.e., greater than or equal to 50.0 MGD).

The Study may be developed using the applicable subparts of Section 125.95(b) of the proposed rule as guidance. Alternatively, the discharger may use the document *Draft Guidance for Evaluation the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: 316(b) AL 92-500, 05/1977* as a basis for developing the Study.

Once the proposed regulation, 40 CFR 125, Subpart J, is finalized by the USEPA, Duke Energy may be required to perform a revised Section 316(b) study and demonstrate compliance with the final performance standards of the regulation.

B.3 Updated Eelgrass Study

The discharger shall perform a study to monitor the geographical extent, density, and condition of eelgrass (*Zostera*) beds in South San Diego Bay affected by the discharge from the SBPP. The study would address the ability of the eelgrass beds to support and maintain a balanced indigenous population of fish, shellfish, and wildlife in the area under the influence of the power plant discharge. The purpose of the study would be to evaluate the ability of eelgrass beds to provide habitat and food and to otherwise influence the occurrence of valuable native or endangered species in south San Diego Bay, including the green sea turtle, which would occur with or without the presence of the discharge. At a minimum, turbidity measurements would be made to evaluate the effects of power plant operation on eelgrass beds and provide information of value in documenting and predicting the effects of normal plant operation and changes in eelgrass beds should the power plant increase or decrease the amount of thermal discharge. The emphasis of the turbidity study would be to discriminate between the effects of wind versus possible increased turbidity caused by the power plant. This study would provide information on changes in the eelgrass beds and could supplement and update the information provided by the discharger in the January 2000 report, *Environmental Controls on the Distribution of Eelgrass (Zostera marina L.) in South San Diego, Bay* (Merkel & Associates, 2000). Furthermore, the discharger may utilize the discharge and receiving water monitoring data collected, as part of Monitoring and Reporting Program No. 96-05, in conducting this study

B.4 Updated Dissolved Oxygen Assessment Study

The discharger shall conduct a dissolved oxygen (DO) assessment study to assist in the determination of an appropriate numerical site specific water quality objective for DO in the SBPP discharge channel and other areas of south San Diego Bay.

The study shall also investigate the impact of the thermal plume from SBPP on naturally occurring DO levels in south San Diego Bay and the saturated DO levels associated with the elevated temperature discharges. The DO study will investigate the ability of the south San Diego Bay area affected by the SBPP discharge to support a balanced indigenous population of fish, shellfish, and wildlife in that area.

The study could supplement and update the findings of previous studies such as the *Technical Rationale and Supporting Documentation for a Proposed Water Quality Objective for Dissolved Oxygen in South San*

Diego Bay (Applied Science Associates, 1998) and *Thermal Distribution and Biological Studies for the South Bay Power Plant* (Pioneer Service & Engineering Co., 1973). Furthermore, the discharger may utilize the discharge and receiving water DO monitoring data collected, as part of Monitoring and Reporting Program No. 96-05, in conducting this study.

B.5 Investigation of Compatibility of Discharge with the Goals of the South San Diego Bay National Wildlife Refuge

The discharger shall consult with U.S. Fish and Wildlife Service to determine the goals and objectives of the South San Diego Bay National Wildlife Refuge and investigate the impact of the thermal discharge on these objectives. The investigation shall be conducted under the auspices of a Refuge Special Use Permit (SUP).

B.6 Special Sunset Study

When a decision is made to construct a new power plant, terminate the discharge, or to make major modifications to reduce the amount of heat discharged to south San Diego Bay, you shall notify the Regional Board and be prepared to conduct a Special Sunset Study. The Regional Board or the Executive Officer may, at that time, require the you to initiate a special study for the purpose of understanding the effects of proposed changes on the beneficial uses of south San Diego Bay. The study will describe the possible changes and estimate the effects on beneficial uses, including the maintenance of a balanced indigenous population of fish, shellfish, and wildlife in the area under the influence of the power plant discharge. Special consideration will also be given to endangered species, such as the western snowy plover, light-footed clapper rail, California least tern, California brown pelican, and green sea turtle. The Special Sunset Study would also include measures that would mitigate any adverse impacts resulting from significant modifications in the cooling water discharge. The study shall be developed in consultation with the representatives of the following resource agencies: USEPA, Department of Fish and Game (DFG), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), RWQCB/SWRCCB, and the California Coastal Commission. The study shall be conducted in such a manner as to ensure its completion at least 24 months prior to the initiation of any significant reduction, or termination of the cooling water discharge.

As part of the Special Sunset Study, the Regional Board or Executive Officer may recommend the formation of a technical advisory committee comprised of external technical experts to review and develop recommendations to the Regional Board on the proposed plan for the Special Sunset Study and to review results of the study.

C. Schedule for Initiation and Implementation of Studies

C.1 Outlines for Workplans

Outlines for the Workplans for Studies Nos. 1, 2, 3, 4, and 5 (listed in Section B) shall be submitted no later than 75 days from the date of this letter to the Regional Board -and to the following resource agencies USEPA, Department of Fish and Game (DFG), U.S. Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS), for review and comment.

C.2 Final Workplans

Duke Energy shall incorporated the comments and recommendations made by the Regional Board and resource agencies regarding the outlines for the Workplans and submit Final Workplans for the Study Nos. 1, 2, 3, 4. and 5, no later than 75 days after submittal of Outlines.

C.3 Commencement of Studies

Duke Energy shall commence implementation of Studies Nos. 1, 2, 3, 4, and 5 based on Final Workplans, no later than 45 days after submittal of the Final Workplans.

C.4 Progress Reports

Progress reports shall be required for Studies Nov. 1, 2, 3, 4, and 5. These progress reports shall be submitted on a quarterly basis, after commencement of studies. The outline for the Workplans (Section C. 1) shall identify the information the discharger proposes to include in the progress reports.

C.5 Submittal of Final Reports

Duke Energy shall complete Studies Nos. 1, 2, 3, 4, and 5, and submit Final Technical Reports no later than 425 days from the commencement date of the studies (365 days of collection of data and completion of studies and 60 days for compilation of Final Technical Reports). The outline for the Workplans (Section C.1) shall identify the information and analysis the discharger proposes to include in the Final Technical Reports.

Failure to comply with this request may result in a civil liability being assessed by the Regional Board under authority of Sections 13268 of the California Water Code (CWC). The CWC provides that any person failing or refusing to furnish technical or monitoring program reports required under Section 13267(b) is guilty of a misdemeanor and may be subject to administrative civil liabilities up to \$1,000 per day of violation. The Superior Court may impose civil liability of up to \$5,000 per day of violation.

If you have any questions regarding this letter, please contact Mr. Hashim Navrozali (TEL: 858-467-2981, e-mail at navrh@rb9.swrcb.ca.gov) or Mr. John Phillips (TEL: 858-627-3928, e-mail: philj@rb9.swrcb.ca.gov).

Respectfully,

JOHN H. ROBERTUS
Executive Officer

Attachment

CC: Joe Okanagan, California Energy Commission, Sacramento
Kenneth Schiff, Southern California Coastal Water Research Pro act, Westminster
Dan Chia, California Coastal Commission, San Francisco
Bill Paznokas, California Department of Fish and Game, San Diego
Terry Oda, USEPA Region 9, San Francisco
Scott Sobiech, U.S. Fish and Wildlife Service, Carlsbad
Bob Hoffman, National Marine Fisheries Service, Long Beach
Mr. David Merk, Part of San Diego, San Diego
Environmental Affairs Manager, City of Chula Vista, Chula Vista
Laura Hunter, Environmental Health Coalition, San Diego
Bruce Reznik, San Diego BayKeeper, San Diego
James Peugh, San Diego Audubon Society, San Diego
Ed Kimura, Sierra Club, San Diego Chapter

Appendix B

Daily Average Temperatures: July 17–September 30, 2003

Table B1. Daily average surface temperatures.

Table B2. Daily average subsurface (1- m) temperatures.

Table B3. Daily average bottom temperatures.

Table B4. Daily average intertidal temperatures.

Appendix E

Dissolved Oxygen Study Data

Table E1a. Hydrolab Multiprobe deployment periods for each of the eight south San Diego Bay monitoring stations. “Type” refers to the South Bay Power Plant discharge channel (DC) and south San Diego Bay open water (OW) monitoring sites.

Station	Type	Hydrolab Multi-probe Deployment Dates–2003
1	DC	7/18 - 7/31; 8/5 - 8/8; 8/21 - 8/25; 8/29 - 9/3
2	OW	7/24 - 7/31; 8/8 - 8/13; 8/21 - 8/25; 9/3 - 9/10
3	DC	7/3 - 7/14; 7/24 - 7/31; 8/8 - 8/13; 8/21 - 8/25; 9/11 - 9/15
4	OW	8/1 - 8/5; 8/13 - 8/18; 8/26 - 8/29; 9/11 - 9/15
5	OW	7/3 - 7/14; 8/1 - 8/5; 8/13 - 8/18; 8/26 - 8/29; 9/11 - 9/15
6	OW	7/3 - 7/14; 8/1 - 8/5; 8/15 - 8/18; 8/26 - 8/29; 9/15 - 9/25
7	OW	7/3 - 7/14; 8/5 - 8/13; 8/15 - 8/18; 9/3 - 9/10; 9/15 - 9/25
8	OW	7/18 - 7/24; 8/5 - 8/8; 8/21 - 8/25; 9/3 - 9/10; 9/15 - 9/25

Table E1b. Hydrolab Multiprobe deployment periods for each of the four dissolved oxygen reference stations.

Reference DO Station	Multi-probe Deployment Dates–2003
Agua Hedionda (AH)	8/18 - 8/28; 9/3 - 9/23
Batiquitos Lagoon (Bat)	8/20 - 9/12
Seal Beach NWR (SB)	8/19 - 9/23
Sweetwater River (SW)	8/5 - 8/18; 8/29 - 9/25

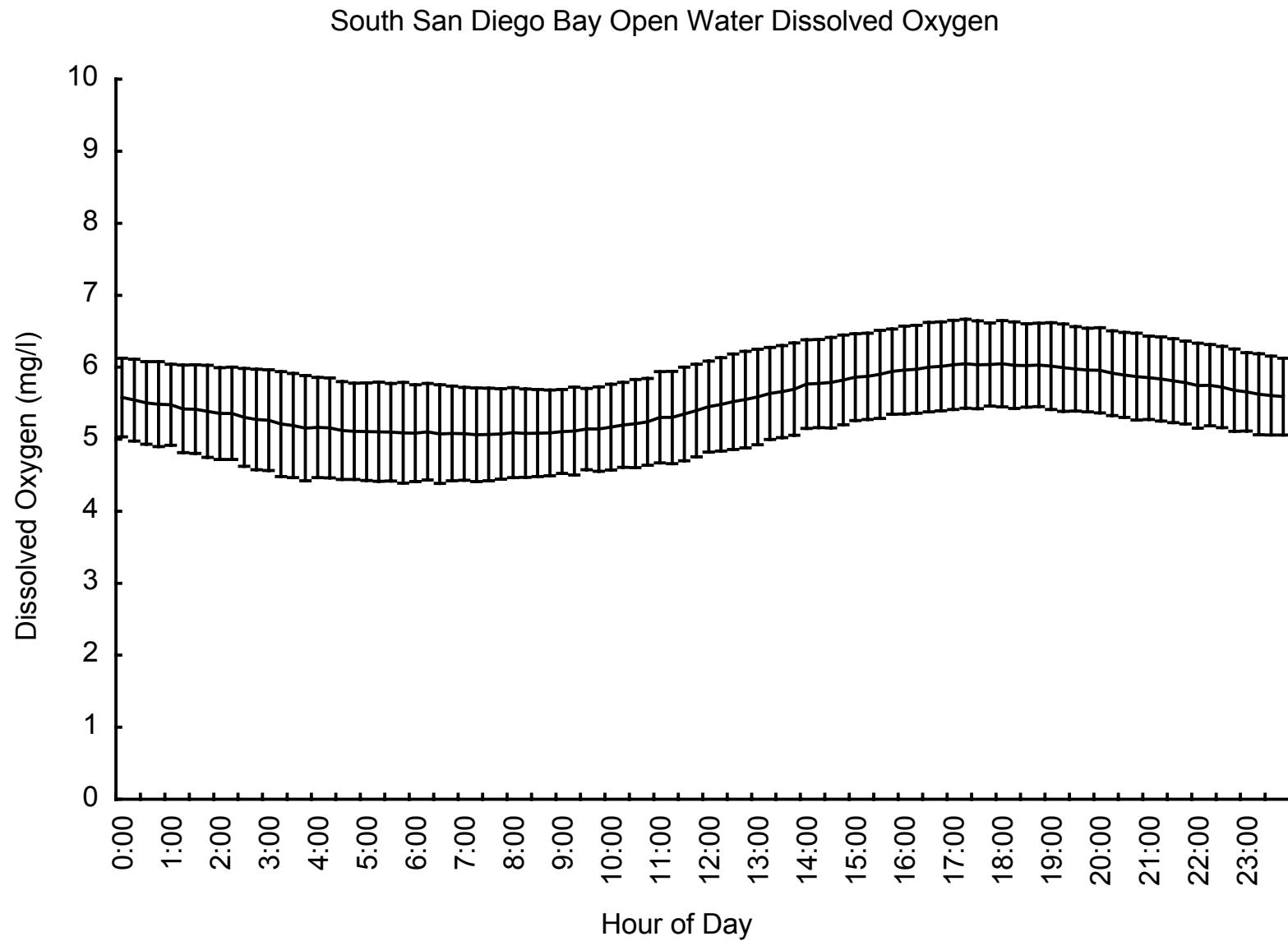


Figure E1. Mean hourly dissolved oxygen curve for the South San Diego Bay open water monitoring stations. Error bars are ± 1 standard deviation.

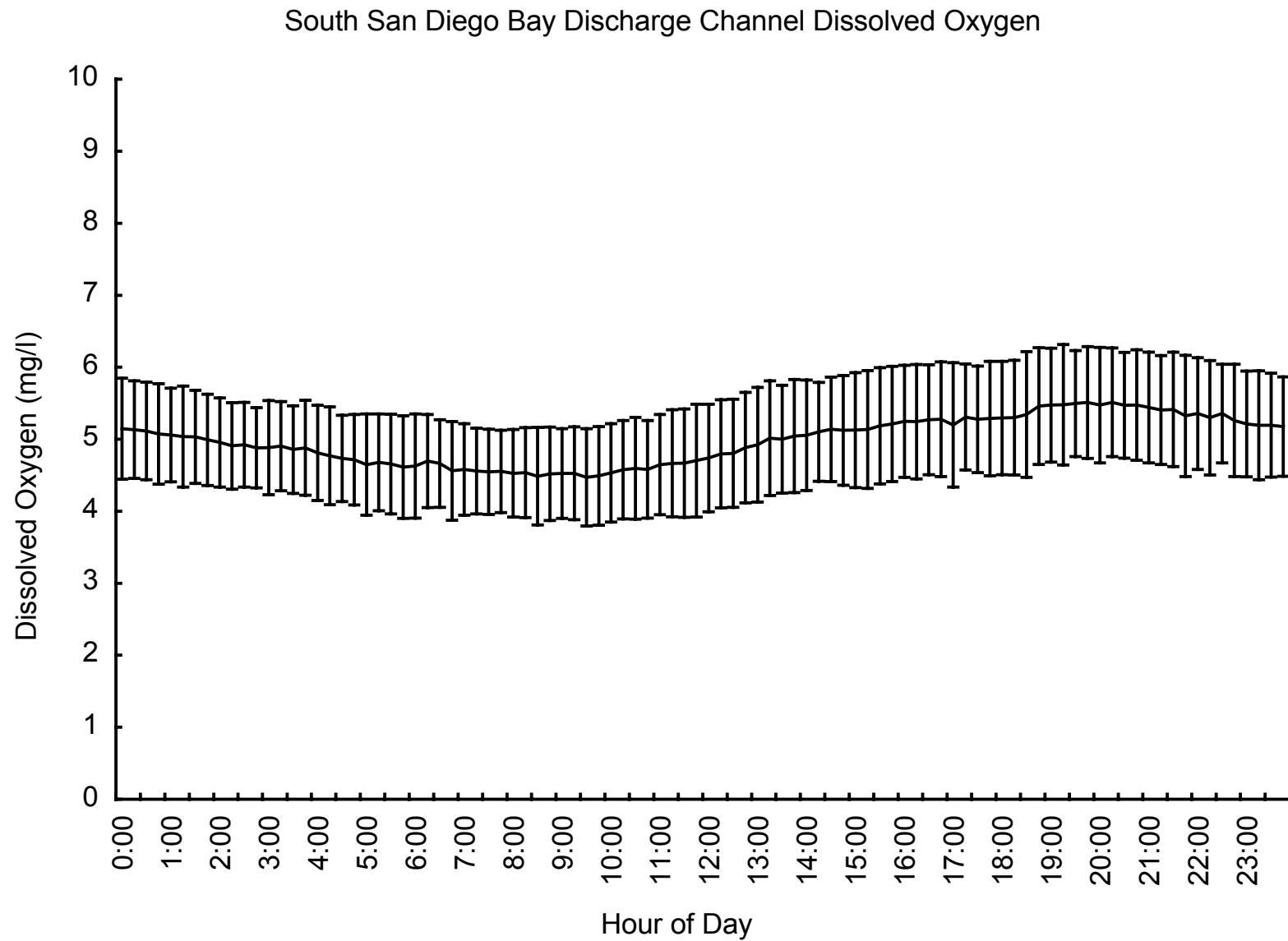


Figure E2. Mean hourly dissolved oxygen curve for the San Diego Bay discharge channel monitoring stations. Error bars are ± 1 standard deviation.

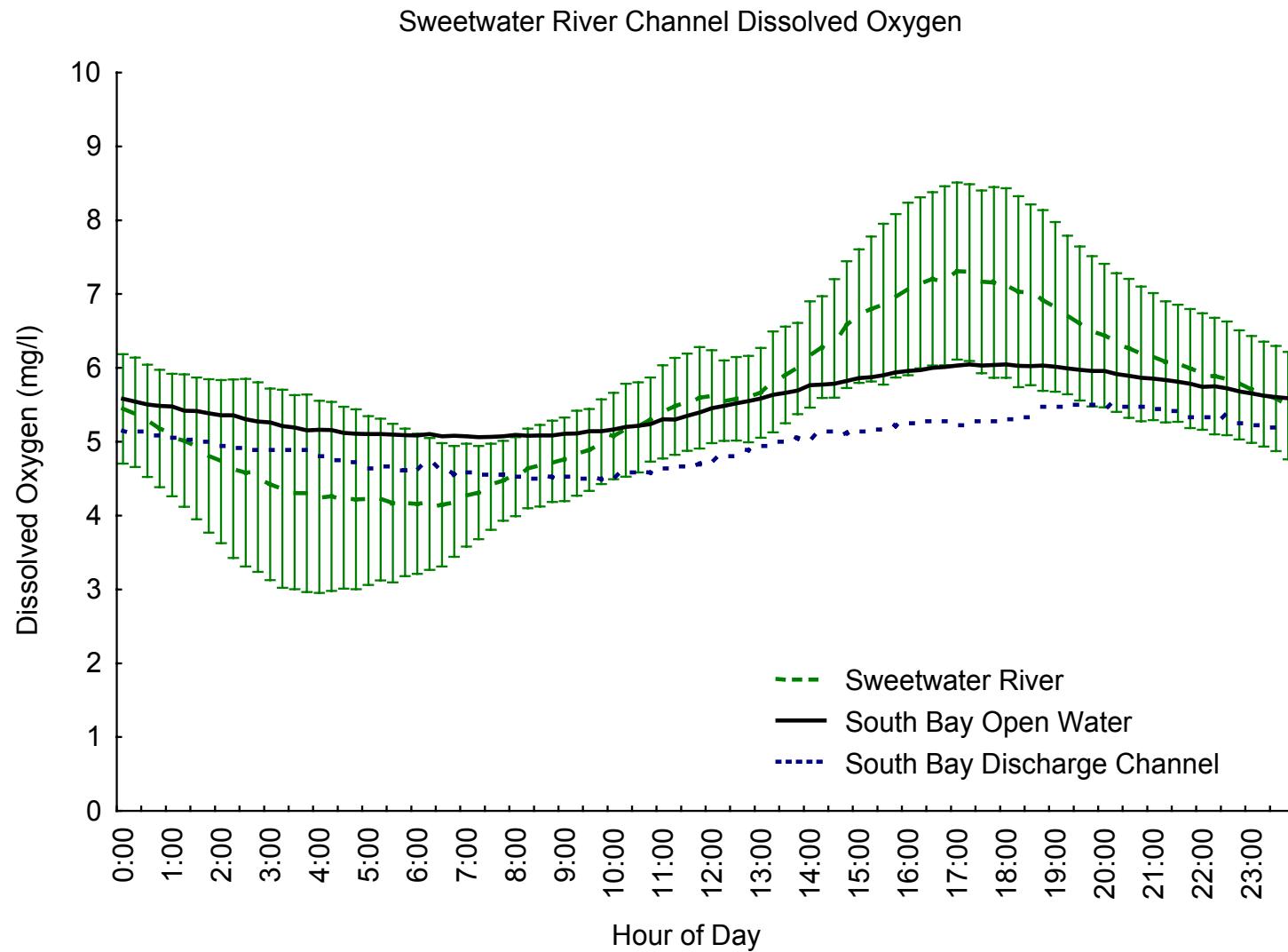


Figure E3. Mean hourly dissolved oxygen curve for the Sweetwater River monitoring station. Error bars are ± 1 standard deviation. Mean hourly dissolved oxygen curves for the South Bay open water and discharge channel data included for comparison.

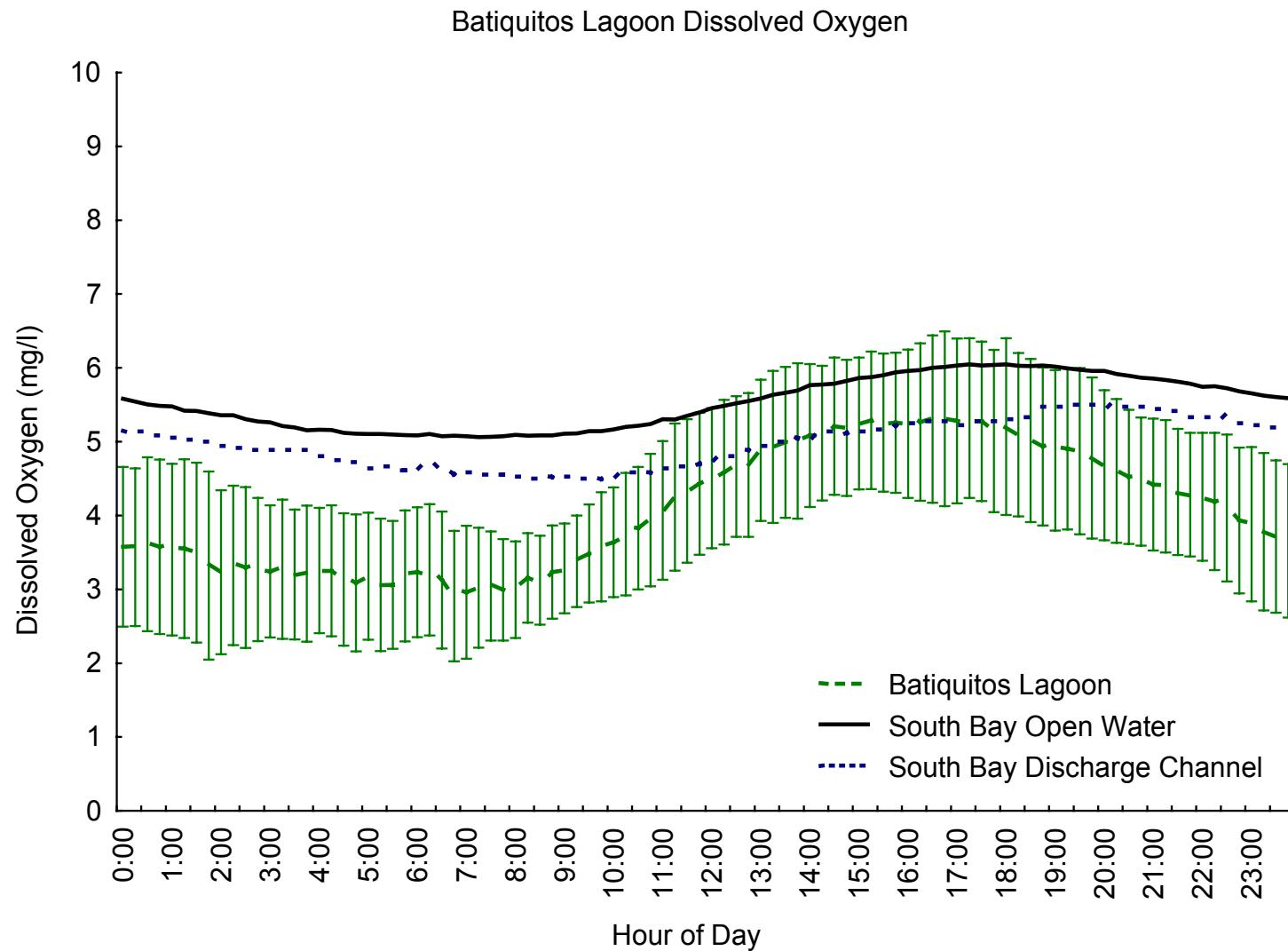


Figure E4. Mean hourly dissolved oxygen curve for the Batiquitos Lagoon monitoring station. Error bars are ± 1 standard deviation. Mean hourly dissolved oxygen curves for the South Bay open water and discharge channel data included for comparison.

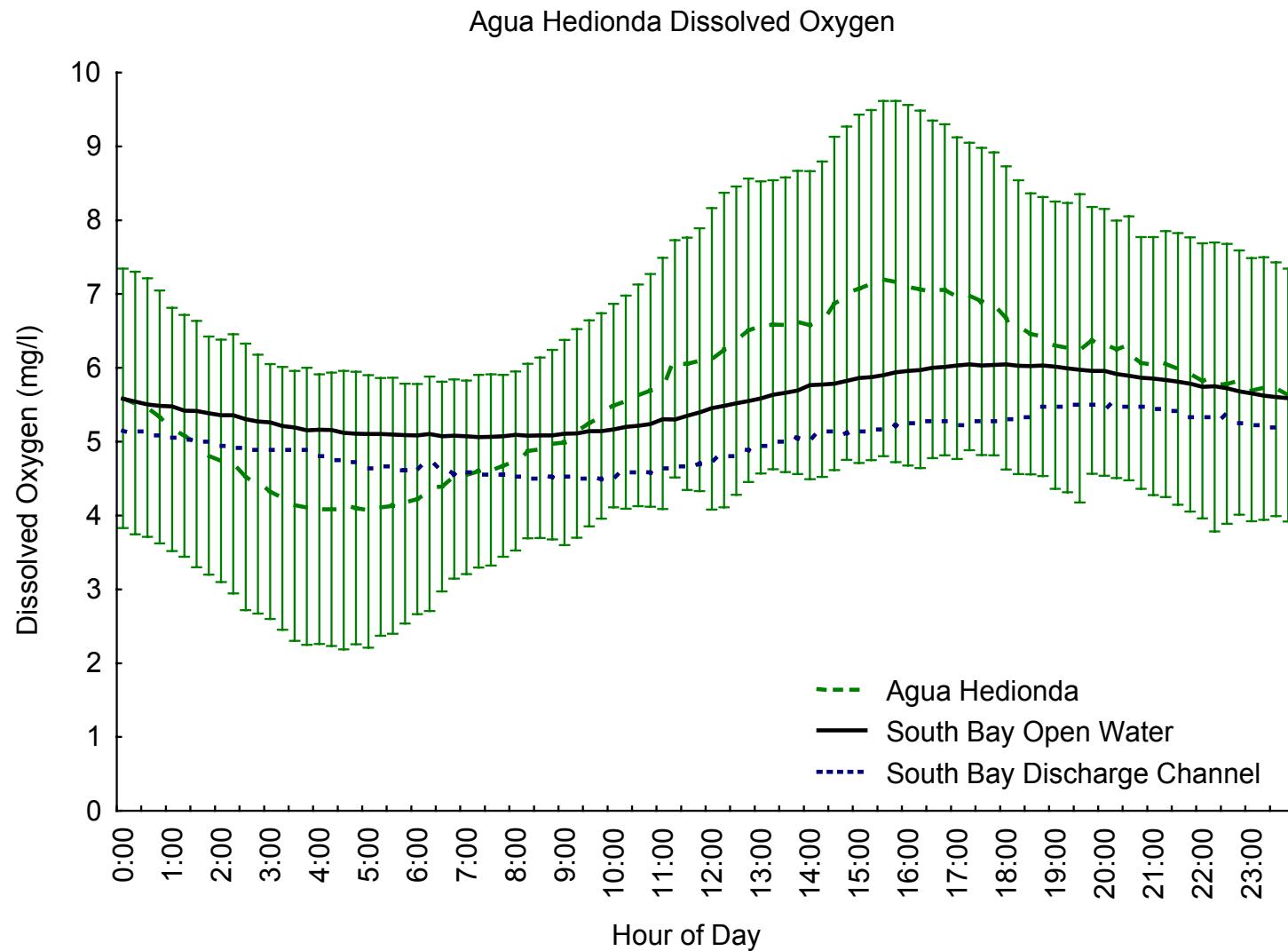


Figure E5. Mean hourly dissolved oxygen curve for the Agua Hedionda monitoring station. Error bars are ± 1 standard deviation. Mean hourly dissolved oxygen curves for the South Bay open water and discharge channel data included for comparison.

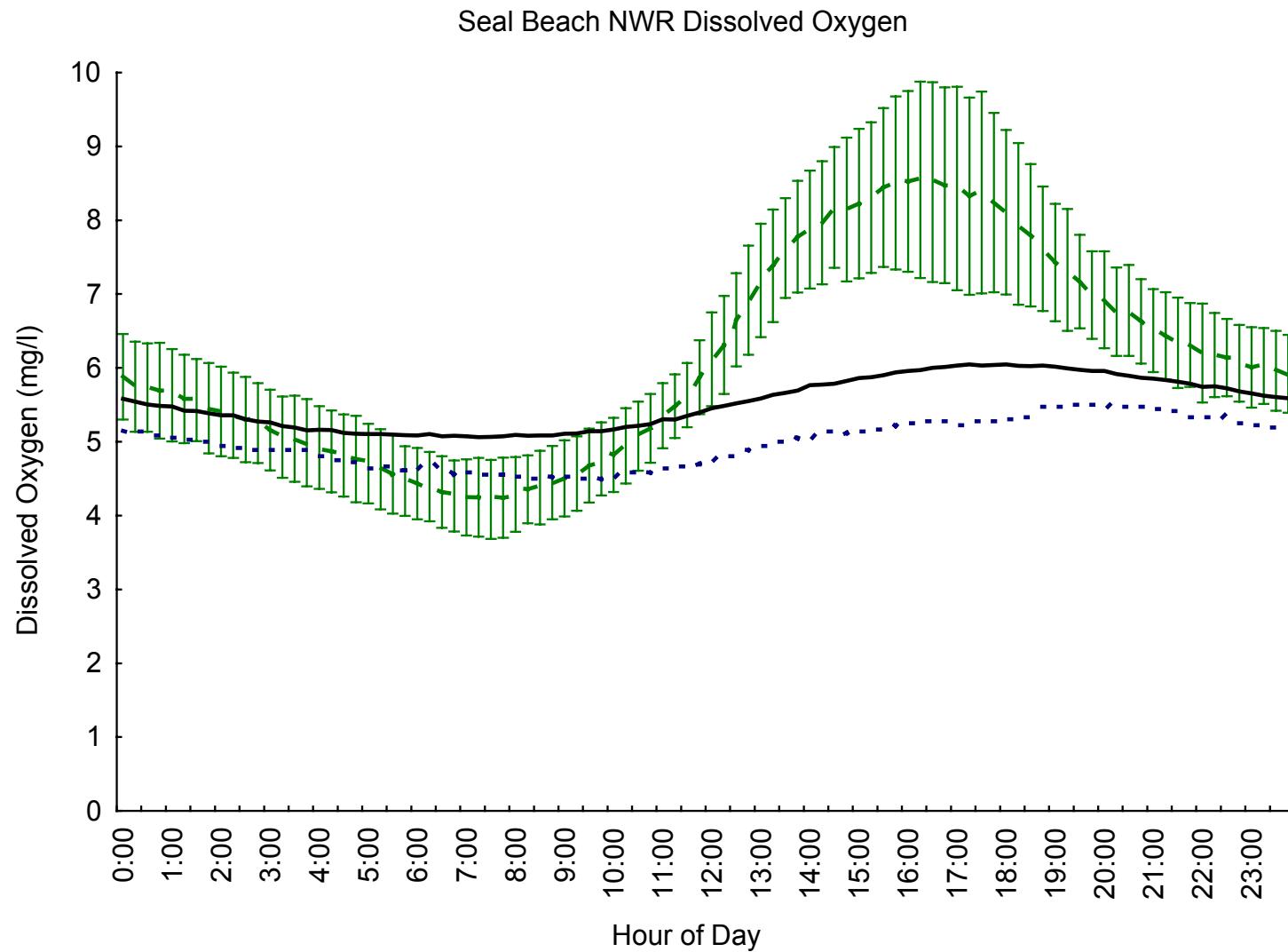


Figure E6. Mean hourly dissolved oxygen curve for the Seal Beach NWR monitoring station. Error bars are ± 1 standard deviation. Mean hourly dissolved oxygen curves for the South Bay open water and discharge channel data included for comparison.

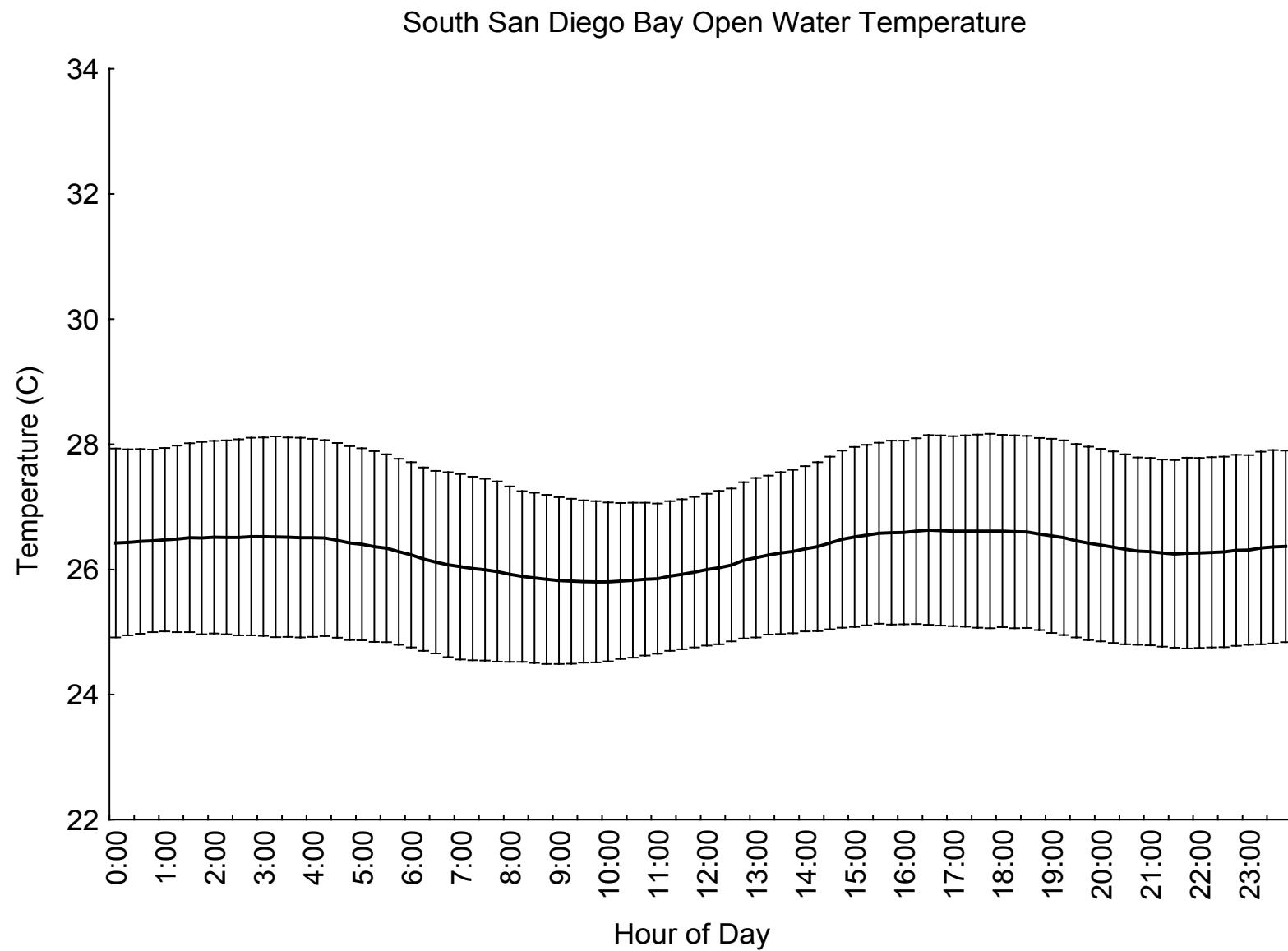


Figure E7. Mean hourly temperature curve for South San Diego Bay open water monitoring stations. Error bars are ± 1 standard deviation.

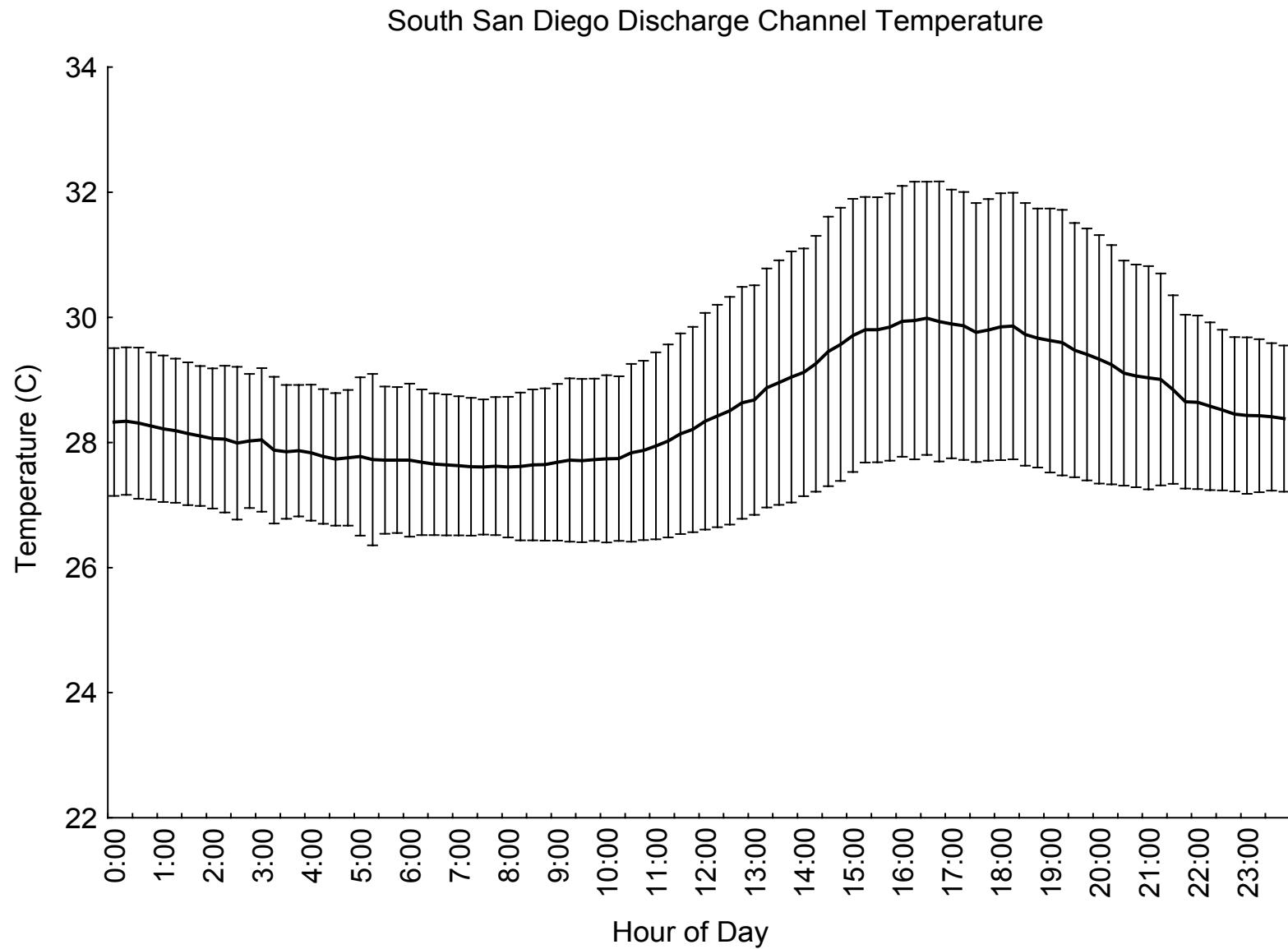


Figure E8. Mean hourly temperature curve for the South San Diego Bay discharge channel monitoring stations. Error bars are ± 1 standard deviation.

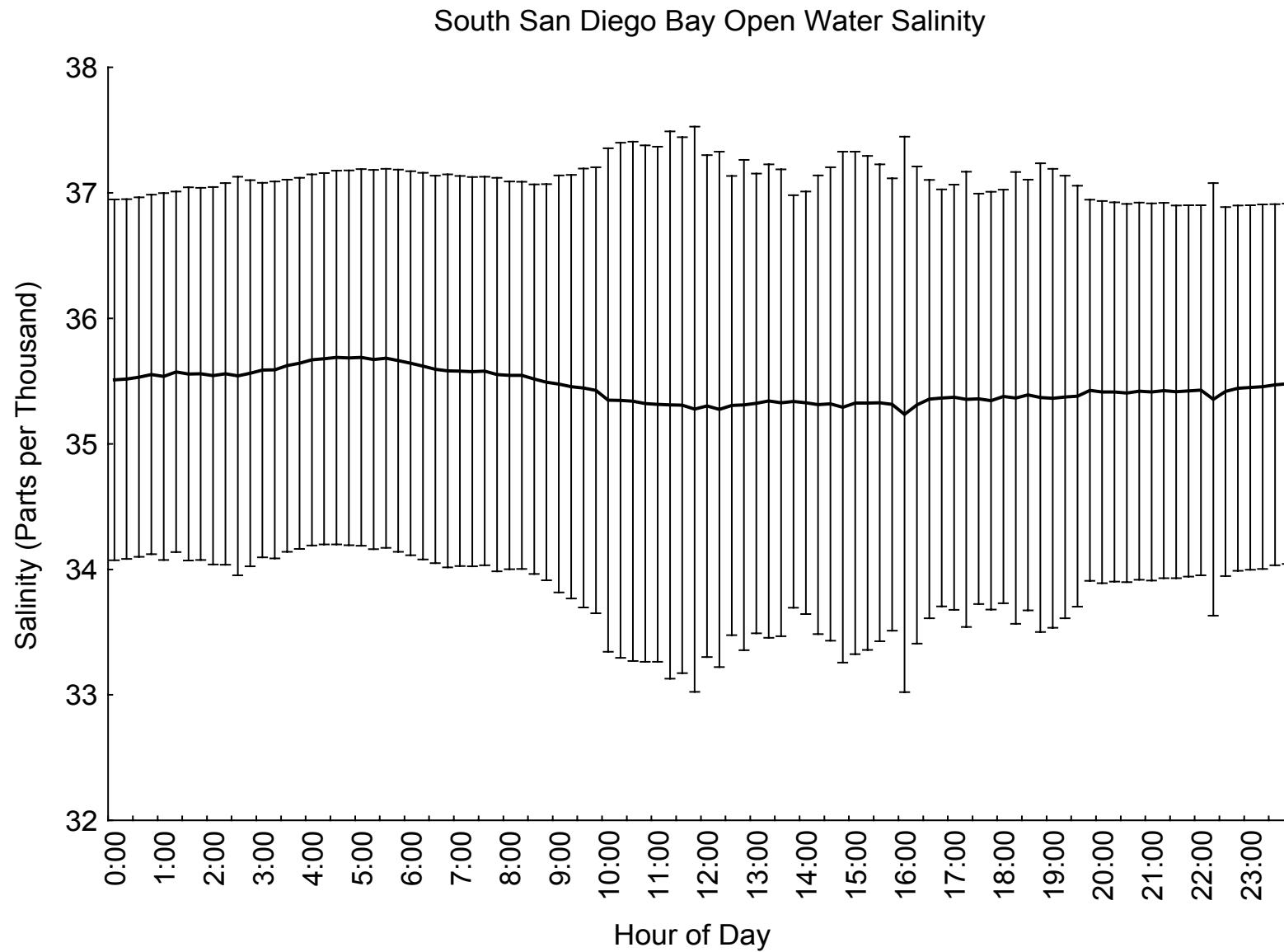


Figure E9. Mean hourly salinity curve for South San Diego Bay open water monitoring stations. Error bars are ± 1 standard deviation.

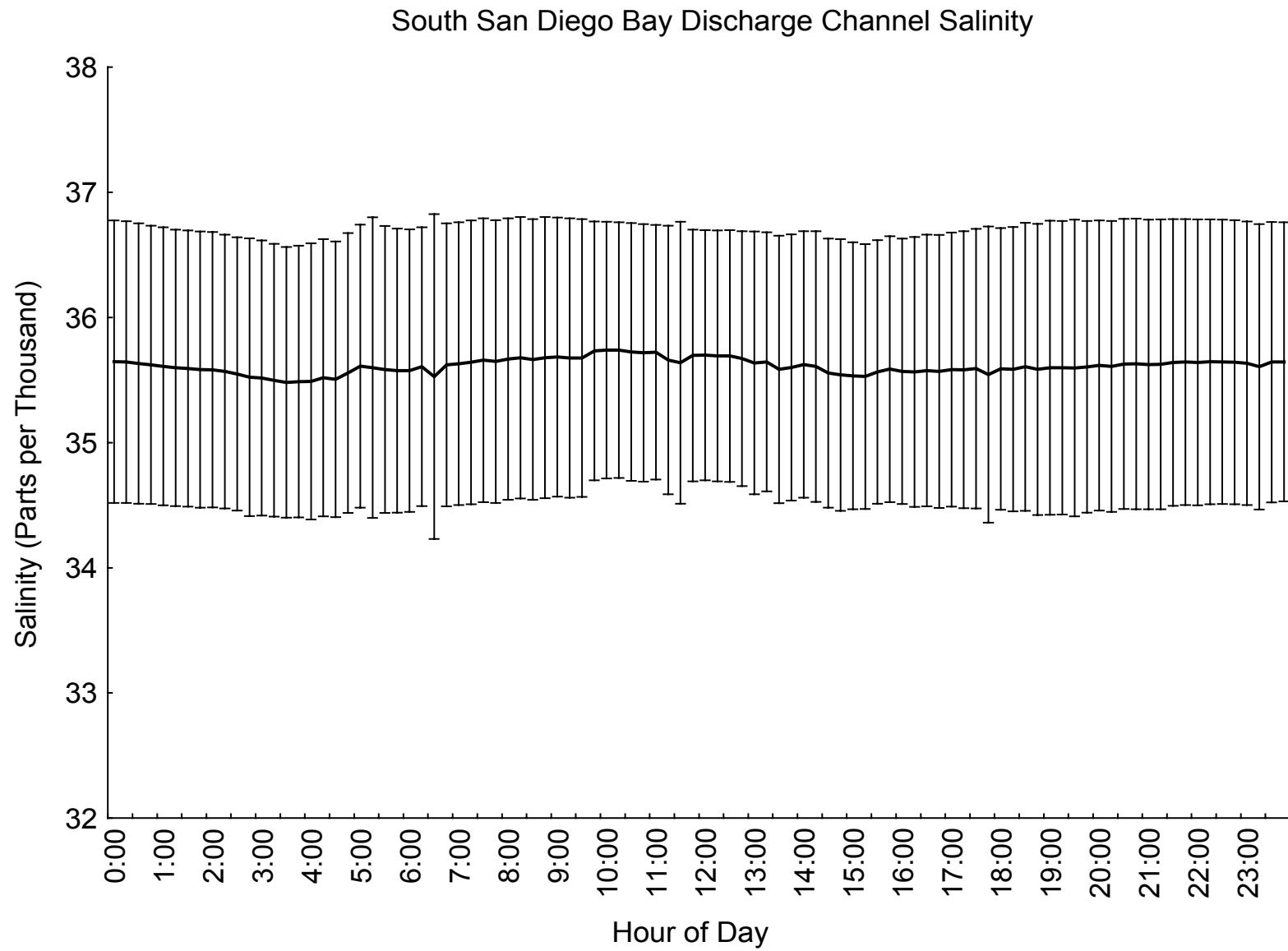


Figure E10. Mean hourly salinity curve for the South San Diego Bay discharge channel monitoring stations. Error bars are ± 1 standard deviation.

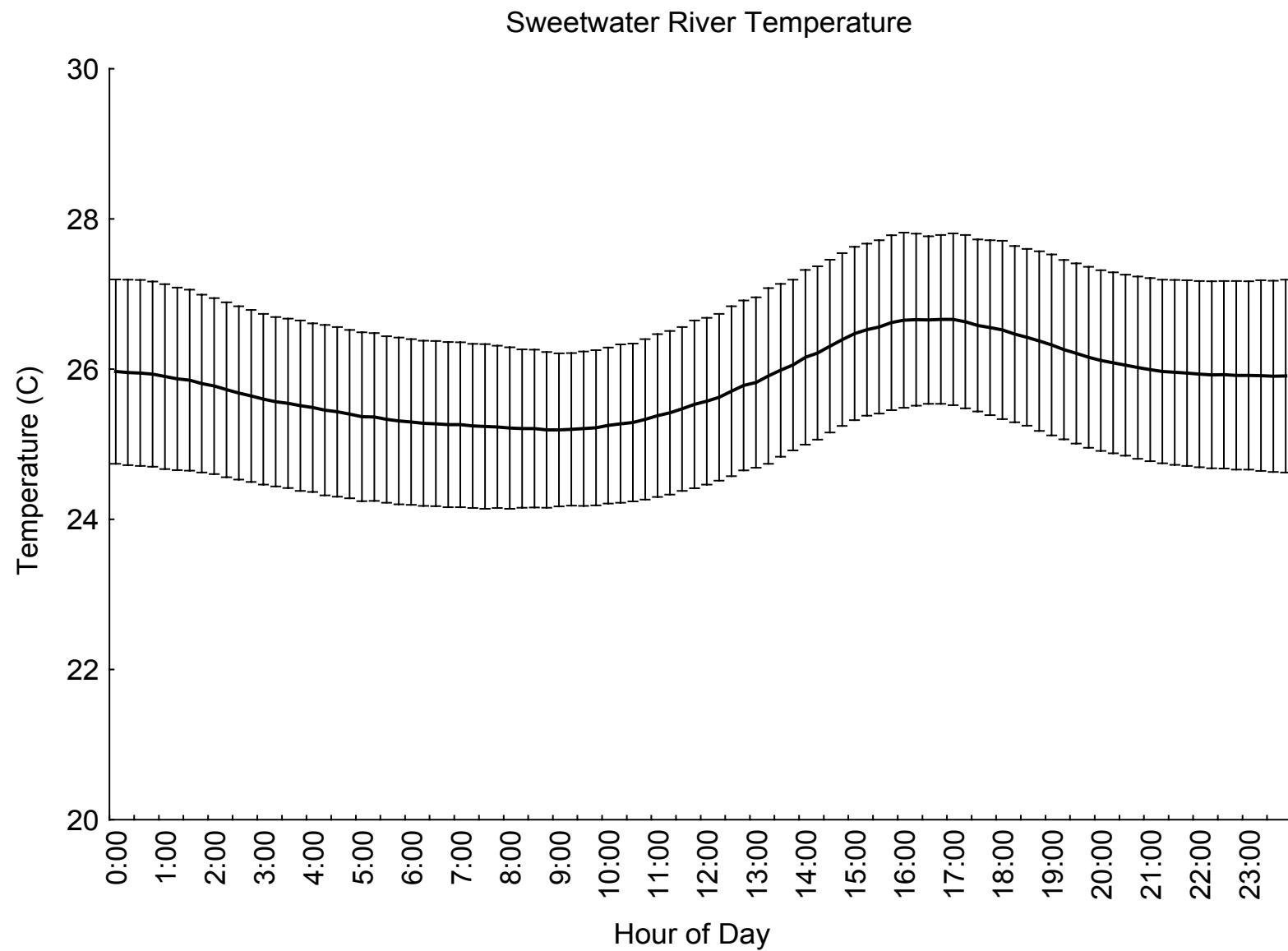


Figure E11. Mean hourly temperature curve for the Sweetwater River monitoring station. Error bars are ± 1 standard deviation.

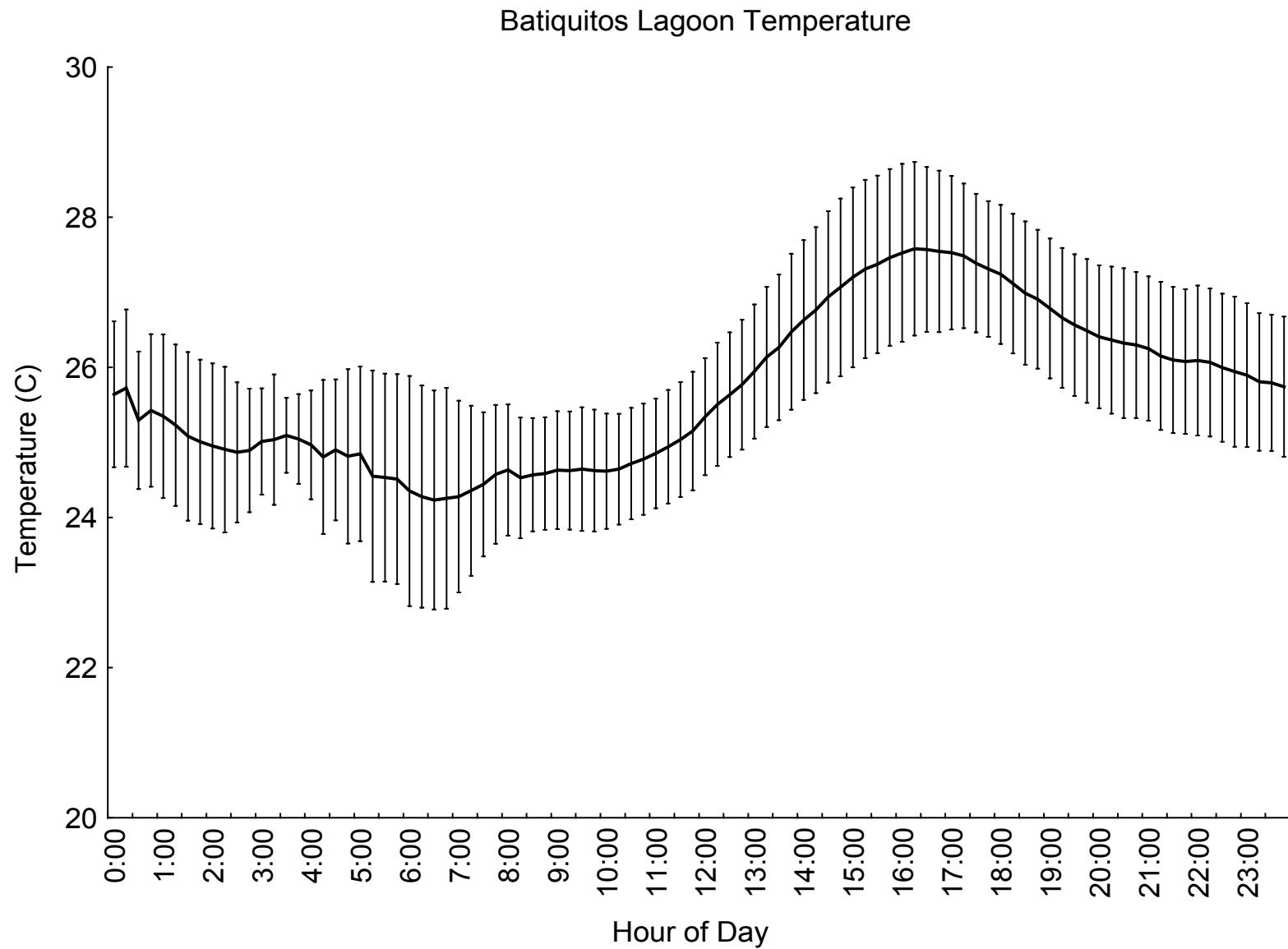


Figure E12. Mean hourly temperature curve for the Batiquitos Lagoon monitoring station. Error bars are ± 1 standard deviation.

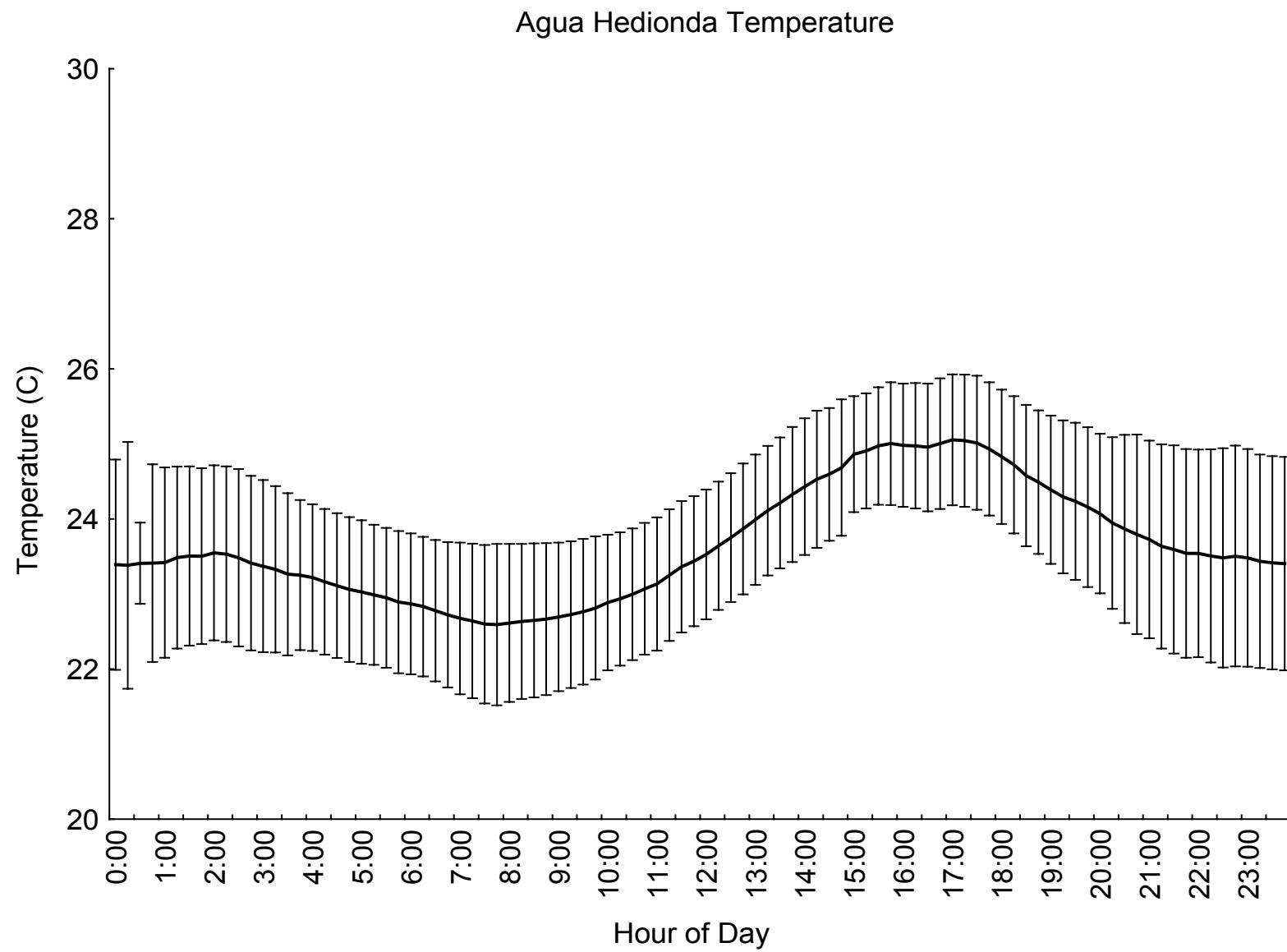


Figure E13. Mean hourly temperature curve for the Aqua Hedionda monitoring station. Error bars are ± 1 standard deviation.

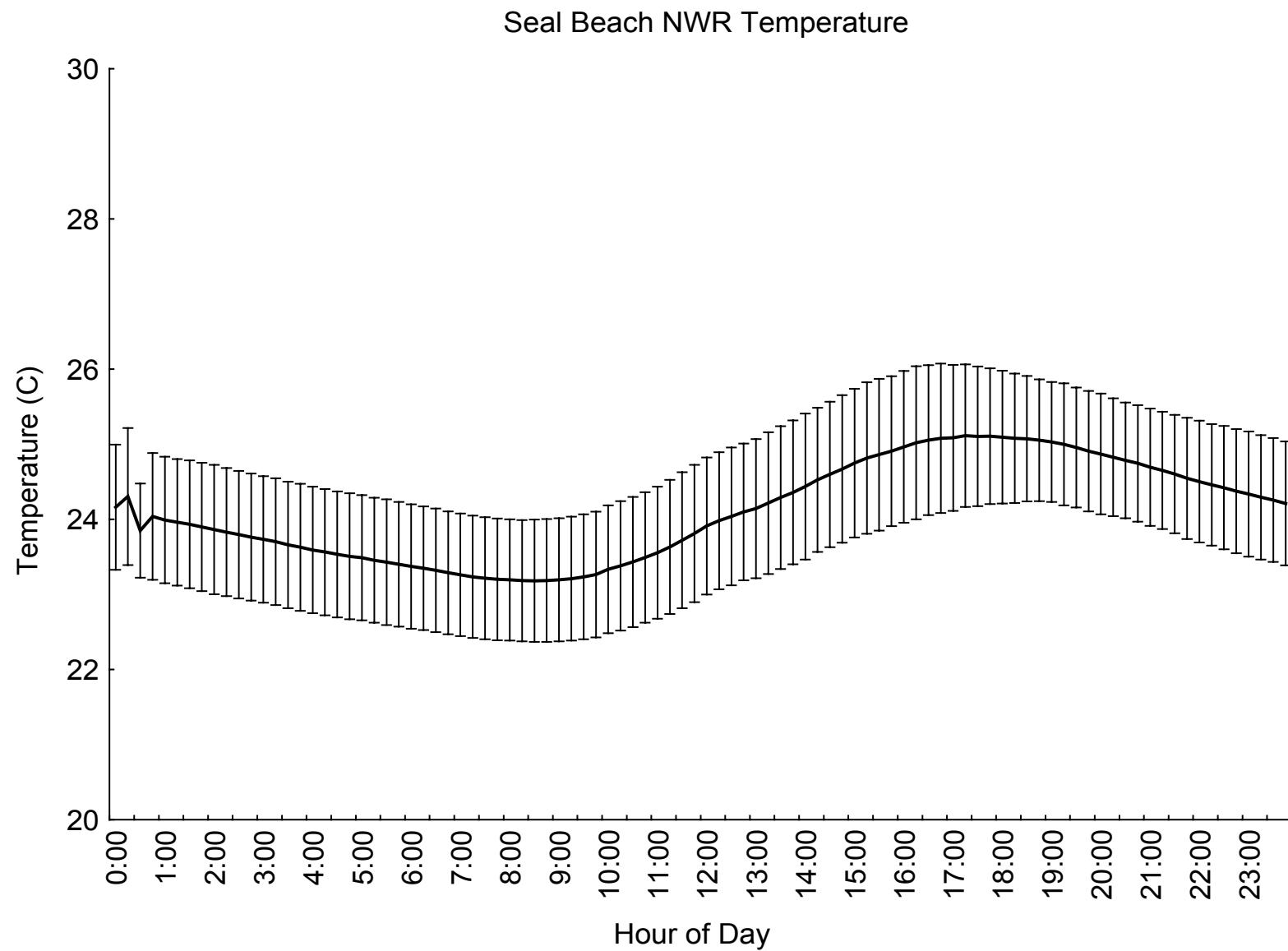


Figure E14. Mean hourly temperature curve for the Seal Beach NWR monitoring station. Error bars are ± 1 standard deviation.

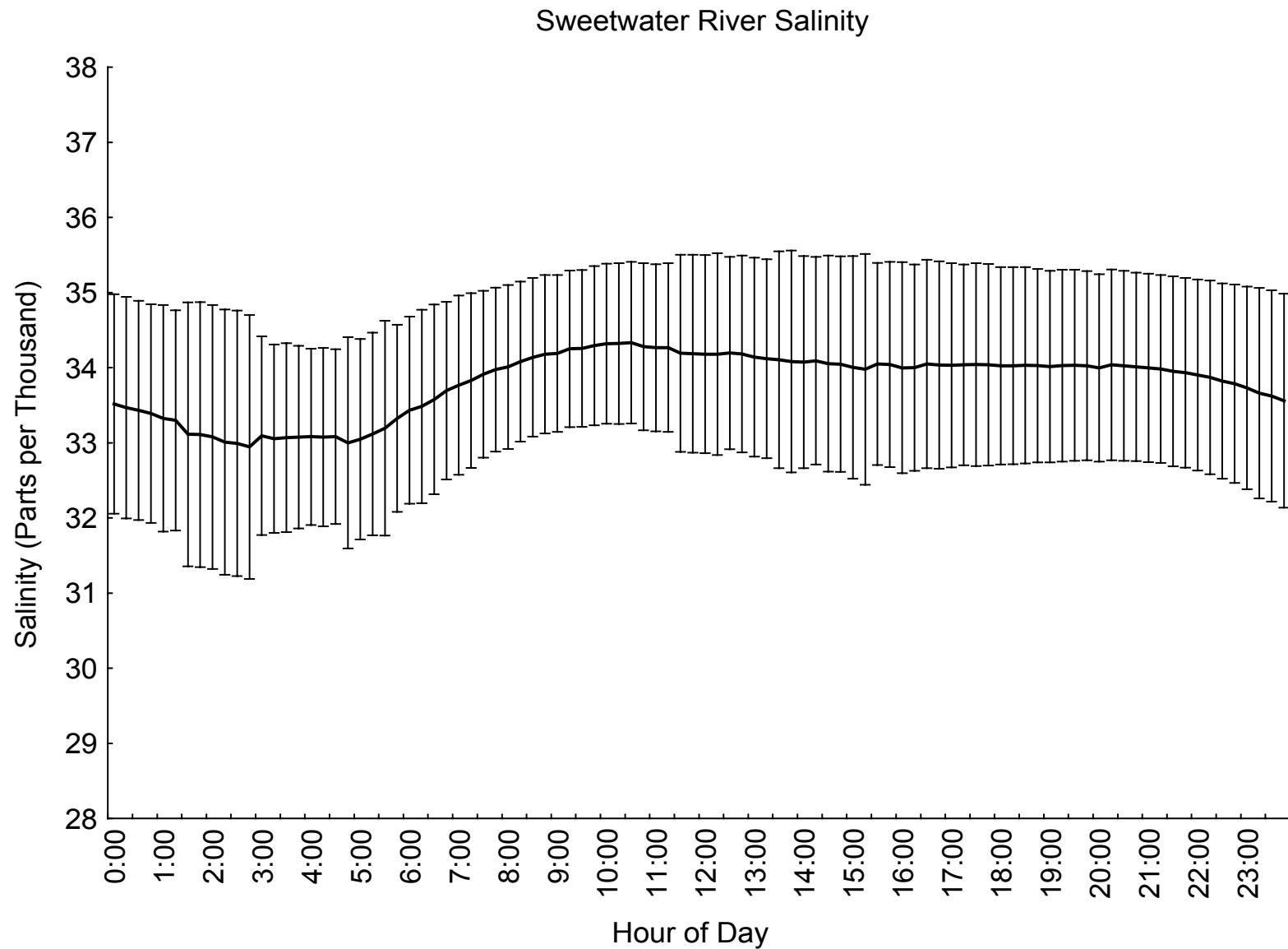


Figure E15. Mean hourly salinity curve for the Sweetwater River monitoring station. Error bars are ± 1 standard deviation.

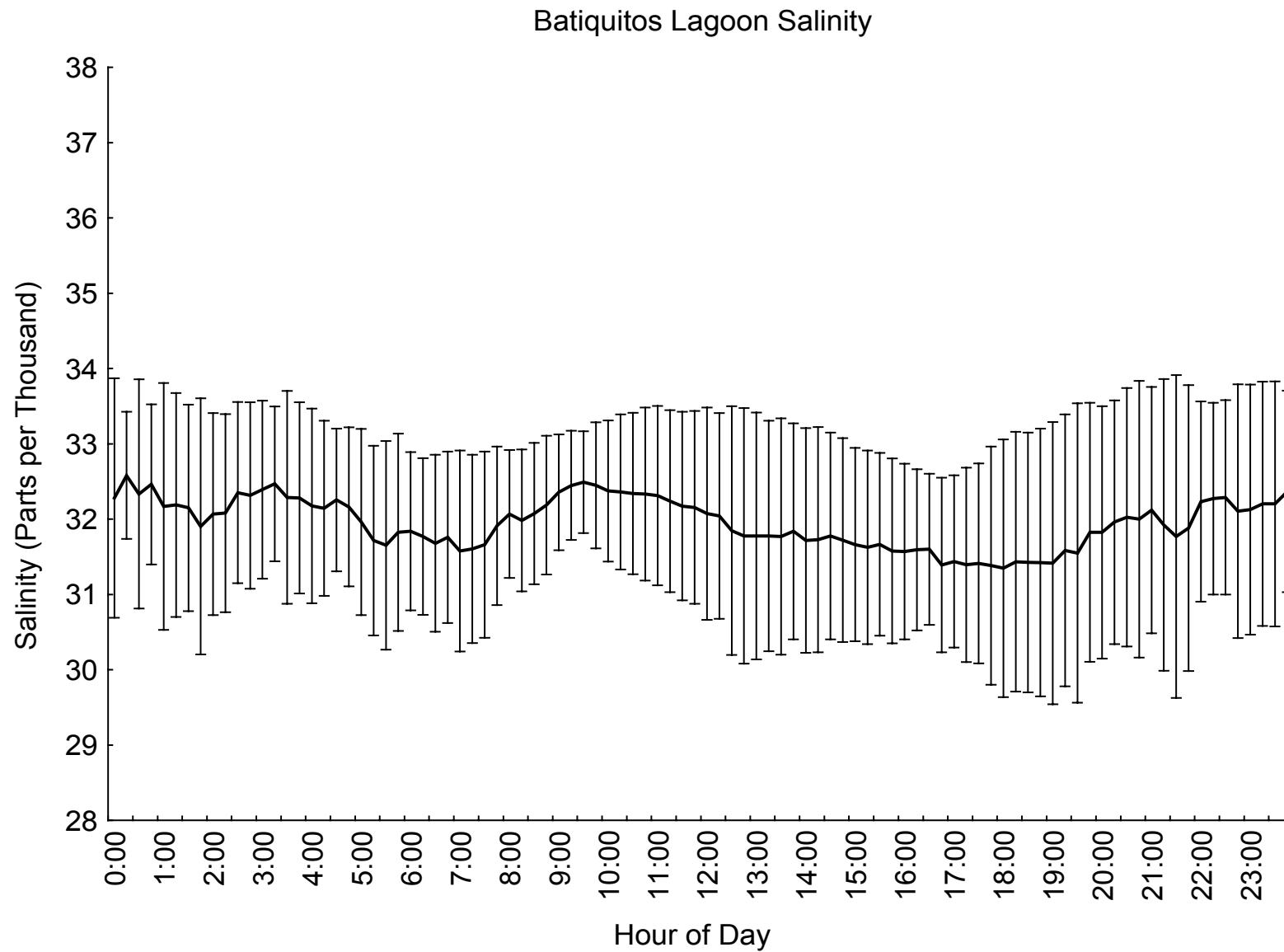


Figure E16. Mean hourly salinity curve for the Batiquitos Lagoon monitoring station. Error bars are ± 1 standard deviation.

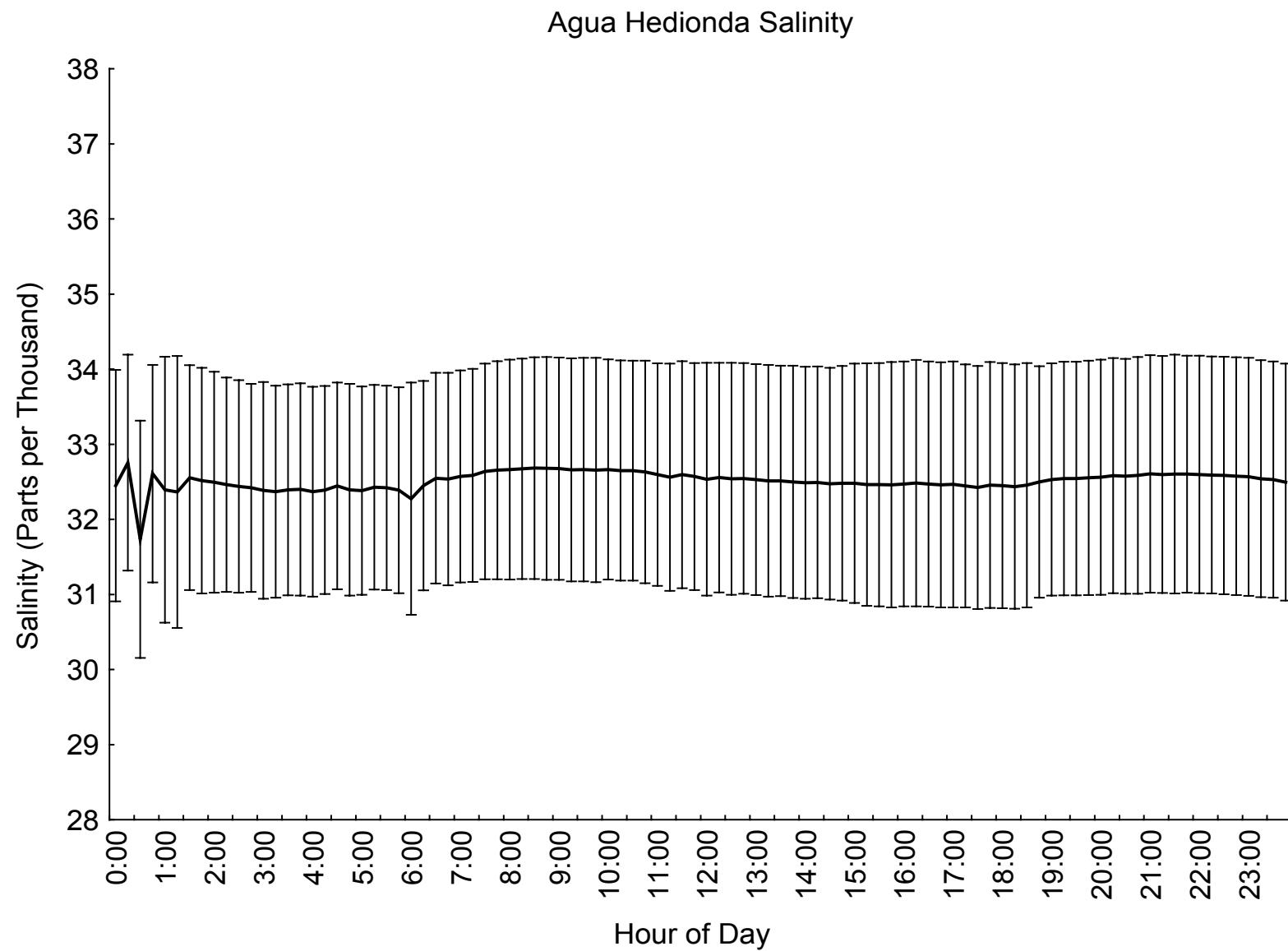


Figure E17. Mean hourly salinity curve for the Agua Hedionda monitoring station. Error bars are ± 1 standard deviation.

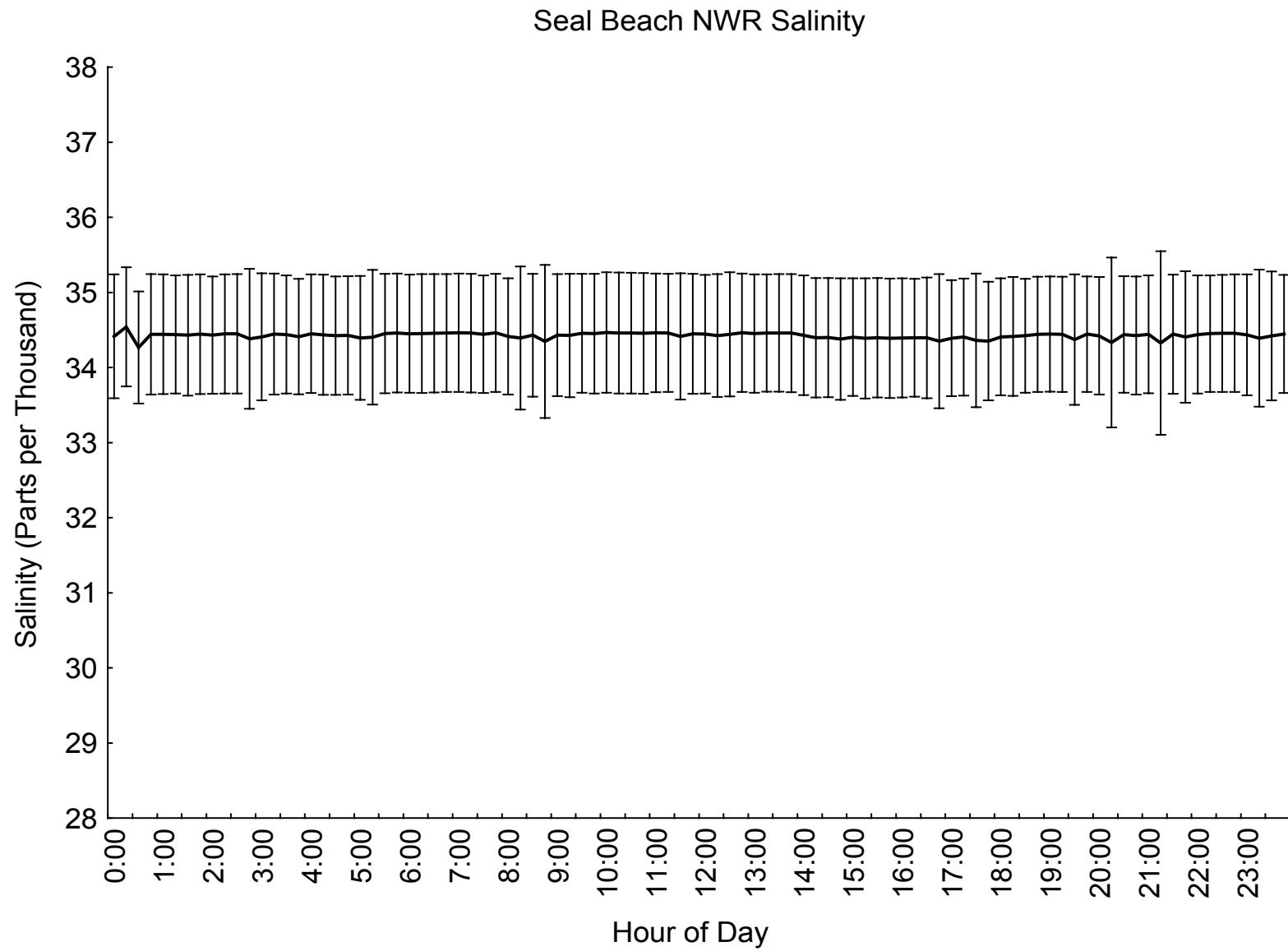


Figure E18. Mean hourly salinity curve for the Seal Beach NWR monitoring station. Error bars are ± 1 standard deviation.

Appendix F

Station Acoustic Doppler Profiler (ADCP) Average and Depth Bin
Current Speed and Direction Estimates August 4–5, 2003

Table F1. Station Acoustic Doppler Profiler (ADCP) Average and Depth Bin Current Speed and Direction Estimates August 4–5, 2003.

Date 2003 PST	Time	Station	North Latitude	East Longitude	Discharge Volume (mgh)	Average Current Speed (cm s ⁻¹)	Average Current Heading (°T)	Depth (m)		0.30	0.30	0.50	0.50
								Bottom Depth (m)	Current Speed (cm s ⁻¹)	Direction (°T)	Speed (cm s ⁻¹)	Direction (°T)	Direction (°T)
8/4	17:28	E3	32.61478	-117.11884	14.5	13.6	5.2	2.0	14.3	4.6	15.9	3.5	
8/4	17:55	E4	32.61442	-117.11453	14.5	6.4	26.6	1.8	5.9	24.1	7.1	28.5	
8/4	18:28	CP6	32.61296	-117.10152	14.5	7.6	274.1	0.8	8.2	273.1	7.8	274.8	
8/4	19:06	M18	32.61272	-117.10433	14.5	14.4	255.8	1.5	16.6	256.6	17.3	250.9	
8/4	19:25	T3	32.61217	-117.10696	14.5	1.6	244.9	1.2	0.1	214.6	0.7	60.6	
8/4	19:50	F4	32.60892	-117.11396	14.5	26.0	252.1	1.8	30.2	235.2	29.5	239.0	
8/5	9:03	E4	32.61421	-117.11451	14.5	2.4	58.5	1.6	4.4	81.1	1.9	135.5	
8/5	9:24	E3	32.61452	-117.11889	14.5	3.3	149.3	1.7	4.7	117.9	3.5	100.9	
8/5	9:49	F3	32.61024	-117.11612	14.5	2.7	151.3	2.0	5.1	104.4	4.8	145.2	
8/5	10:05	F4	32.60907	-117.11427	14.5	7.4	114.7	2.3	9.9	131.0	10.4	120.7	
8/5	10:21	CP12	32.60674	-117.11400	14.5	6.3	139.6	1.2	6.8	136.3	6.8	144.1	
8/5	10:34	CP13	32.60660	-117.11644	14.5	5.6	131.2	1.4	7.8	116.7	6.5	123.1	
8/5	10:49	CP11	32.60459	-117.11670	14.5	2.2	138.4	1.2	4.5	129.1	0.9	198.4	
8/5	11:04	CP3	32.60429	-117.11372	14.5	5.3	144.3	1.2	8.5	147.7	4.0	152.2	
8/5	11:29	CP9	32.60482	-117.11044	14.5	2.8	97.6	0.8	2.9	93.2	2.8	103.6	
8/5	11:47	CP8	32.60896	-117.11008	14.5	4.1	40.1	1.3	4.7	59.3	5.5	43.4	
8/5	12:08	T5	32.61367	-117.11317	14.5	4.7	282.2	2.6	8.1	286.2	4.6	287.5	
8/5	12:24	E5	32.61317	-117.11008	14.5	7.1	299.4	3.3	2.3	288.9	6.9	304.4	
8/5	12:47	T4	32.61230	-117.10724	14.5	1.0	292.1	1.9	3.1	174.0	1.8	326.7	
8/5	13:06	CP5	32.60806	-117.10665	14.5	3.2	38.4	1.2	4.2	55.7	2.9	30.8	
8/5	13:27	T3	32.61270	-117.10427	14.5	5.1	261.8	2.0	4.6	247.9	5.8	253.7	
8/5	13:44	M18	32.61182	-117.10380	14.5	2.0	318.3	1.4	1.8	284.9	4.1	359.3	
8/5	14:03	T2	32.61318	-117.10141	14.5	5.4	283.5	3.9	8.8	288.3	8.3	285.2	
8/5	14:22	E7	32.61334	-117.09906	14.5	11.3	259.5	3.4	16.0	260.8	14.2	262.3	
8/5	14:38	CP6	32.61260	-117.10151	14.5	6.4	291.8	1.4	5.4	275.1	6.8	284.8	
8/5	17:59	CP3	32.60416	-117.11382	18.6	5.5	333.5	1.3	5.2	355.5	6.6	330.0	
8/5	18:16	CP9	32.60471	-117.11018	18.6	1.6	89.0	0.8	1.1	104.8	2.3	79.4	
8/5	18:33	CP5	32.60812	-117.10648	18.6	1.6	289.9	0.8	1.3	136.9	4.4	297.6	
8/5	18:50	M18	32.61199	-117.10373	18.6	6.8	213.0	0.6	7.1	213.8			
8/5	19:06	CP6	32.61273	-117.10182	18.6	3.9	272.8	0.6	4.1	273.2			
8/5	19:22	E7	32.61338	-117.09899	18.6	13.0	265.6	2.4	17.7	269.4	16.1	275.4	
8/5	19:43	T2	32.61327	-117.10163	18.6	18.3	267.5	2.1	19.8	263.3	18.7	264.3	
8/5	19:59	T3	32.61278	-117.10440	18.6	25.1	253.4	2.1	27.6	252.4	26.2	249.8	
8/5	20:17	T4	32.61212	-117.10709	18.6	4.3	170.2	1.7	5.2	160.7	4.5	172.0	
8/5	20:40	CP8	32.60898	-117.11025	18.6	14.3	253.6	0.6	14.9	253.8			
8/5	20:57	E5	32.61321	-117.11011	18.6	12.6	287.7	1.6	13.4	283.0	13.7	285.8	
8/5	21:19	T5	32.61380	-117.11331	18.6	3.1	259.6	3.0	5.4	271.3	7.1	271.2	
8/5	21:38	F4	32.60908	-117.11419	18.6	26.1	264.1	1.9	27.7	266.6	28.5	263.8	
8/5	21:56	CP12	32.60663	-117.11382	18.6	2.4	287.7	0.6	2.5	286.7			
8/5	22:15	CP13	32.60664	-117.11652	18.6	5.7	153.4	0.8	6.4	154.7	5.3	151.8	
8/5	22:33	CP11	32.60458	-117.11673	18.6	4.9	301.2	0.6	5.0	302.2			
8/5	22:54	F3	32.61009	-117.11643	18.6	6.5	290.5	1.6	6.4	291.1	7.0	286.1	
8/5	23:15	E3	32.61445	-117.11917	18.6	6.3	128.6	1.4	8.9	117.8	5.7	124.3	
8/5	23:31	E4	32.61440	-117.11445	18.6	3.2	54.5	1.3	3.4	66.6	4.7	24.0	

Table F1(continued). Station Acoustic Doppler Profiler (ADCP)

Depth Bin (m)	0.70	0.70	0.90	0.90	1.11	1.11	1.31	1.31	1.51	1.51	1.72	1.72
	Speed (cm s ⁻¹)	Direction (°T)	Speed (cm s ⁻¹)	Direction (°T)	Speed (cm s ⁻¹)	Direction (°T)	Speed (cm s ⁻¹)	Direction (°T)	Speed (cm s ⁻¹)	Direction (°T)	Speed (cm s ⁻¹)	Direction (°T)
E3	15.8	9.1	13.6	10.7	17.2	359.2	11.6	11.3	11.3	358.9		
E4	8.4	16.8	8.1	9.8	6.6	15.5	5.6	13.7				
CP6												
M18	12.6	259.0	14.9	258.8								
T3	4.6	81.2										
F4	29.9	253.4	29.1	255.0	26.3	264.8	24.0	270.0				
E4	3.7	47.3	3.3	43.8	2.4	338.6						
E3	4.0	150.1	4.5	177.8	4.6	164.3	2.6	172.1				
F3	3.7	167.9	2.9	146.5	3.6	134.9	1.4	261.8	2.7	197.9		
F4	6.5	116.1	8.7	132.9	8.2	107.9	6.2	95.0	6.6	95.8	7.0	98.3
CP12	6.6	138.2										
CP13	6.3	149.1	3.8	143.6								
CP11	2.5	143.5										
CP3	4.3	129.3										
CP9												
CP8	2.7	16.0	5.2	35.2								
T5	6.9	282.1	6.8	274.4	7.2	278.5	5.1	273.8	2.0	288.1	2.3	291.5
E5	5.2	284.3	7.1	304.7	9.1	300.5	6.7	304.0	6.9	300.0	8.8	309.9
T4	3.3	274.7	1.5	251.8	1.7	324.8	2.7	10.3				
CP5	3.7	20.8										
T3	6.1	250.5	5.3	258.3	6.4	280.5	5.7	272.5	4.2	270.2		
M18	1.9	296.3	1.9	315.5								
T2	9.3	284.6	7.8	282.2	6.3	287.4	4.1	288.7	6.2	270.7	5.6	279.5
E7	14.2	259.8	14.3	257.7	11.7	257.2	12.8	256.5	13.3	257.1	11.0	263.7
CP6	9.3	287.0	6.7	314.7								
CP3	6.3	329.4	5.2	315.2								
CP9												
CP5												
M18												
CP6												
E7	16.8	270.0	15.8	274.4	16.2	264.0	13.1	256.2	11.0	254.4	8.1	258.9
T2	18.4	270.3	20.2	269.8	20.1	264.1	19.8	273.4	18.1	271.4		
T3	28.5	253.4	26.6	253.4	25.5	255.6	25.9	254.0	24.1	255.7	24.4	254.1
T4	5.7	171.2	3.4	174.6	4.2	172.2						
CP8												
E5	14.5	288.6	13.3	292.6								
T5	5.7	261.6	4.3	265.4	3.5	227.9	3.6	200.5	3.8	226.5	0.5	14.3
F4	28.4	264.3	27.1	261.3	26.3	261.9	27.4	266.8				
CP12												
CP13												
CP11												
F3	7.4	296.9	7.9	283.8	5.3	296.1						
E3	5.2	133.3	7.1	143.8								
E4	3.3	63.7	2.3	63.3								

Table F1(continued). Station Acoustic Doppler Profiler (ADCP)

<i>Depth Bin (m)</i>	1.92	1.92	2.12	2.12	2.32	2.32	2.52	2.52	2.73	2.73	2.93	2.93	3.13	3.13
Station	Speed (cm s ⁻¹)	Dir (°T)												
E3														
E4														
CP6														
M18														
T3														
F4														
E4														
E3														
F3														
F4														
CP12														
CP13														
CP11														
CP3														
CP9														
CP8														
T5	1.5	296.1												
E5	7.6	299.7	9.1	297.9	9.3	293.3	10.6	297.7						
T4														
CP5														
T3														
M18														
T2	6.4	287.6	6.6	270.6	7.2	297.1	5.2	285.9	2.4	223.6	1.3	230.0	1.7	9.7
E7	11.3	261.2	13.5	259.5	9.9	236.3	9.1	271.0	3.4	279.6				
CP6														
CP3														
CP9														
CP5														
M18														
CP6														
E7	8.1	248.9												
T2														
T3														
T4														
CP8														
E5														
T5	2.0	323.0	2.6	289.5	2.9	270.9								
F4														
CP12														
CP13														
CP11														
F3														
E3														
E4														

Appendix G

Hourly Acoustic Doppler Profiler (ADP) Average and

Depth Bin Current Speed and Direction Estimates

July 17 – August 14, 2003

Appendix H

Turbidity and Wind Monitoring Data

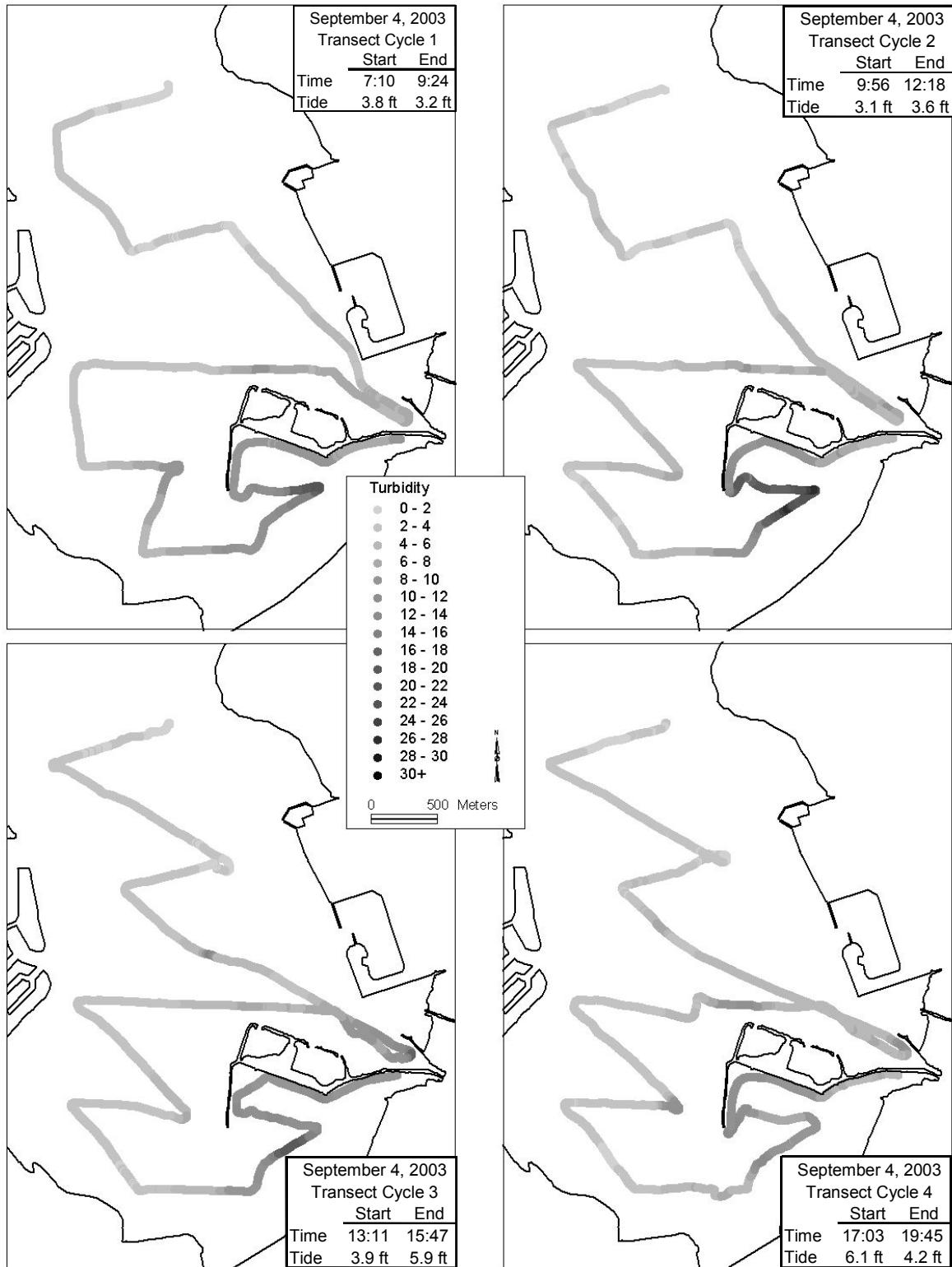


Figure H1. Results of towed turbidity data collection. Transect cycles 1 through 4, September 4, 2003. Times are Pacific Daylight Time.

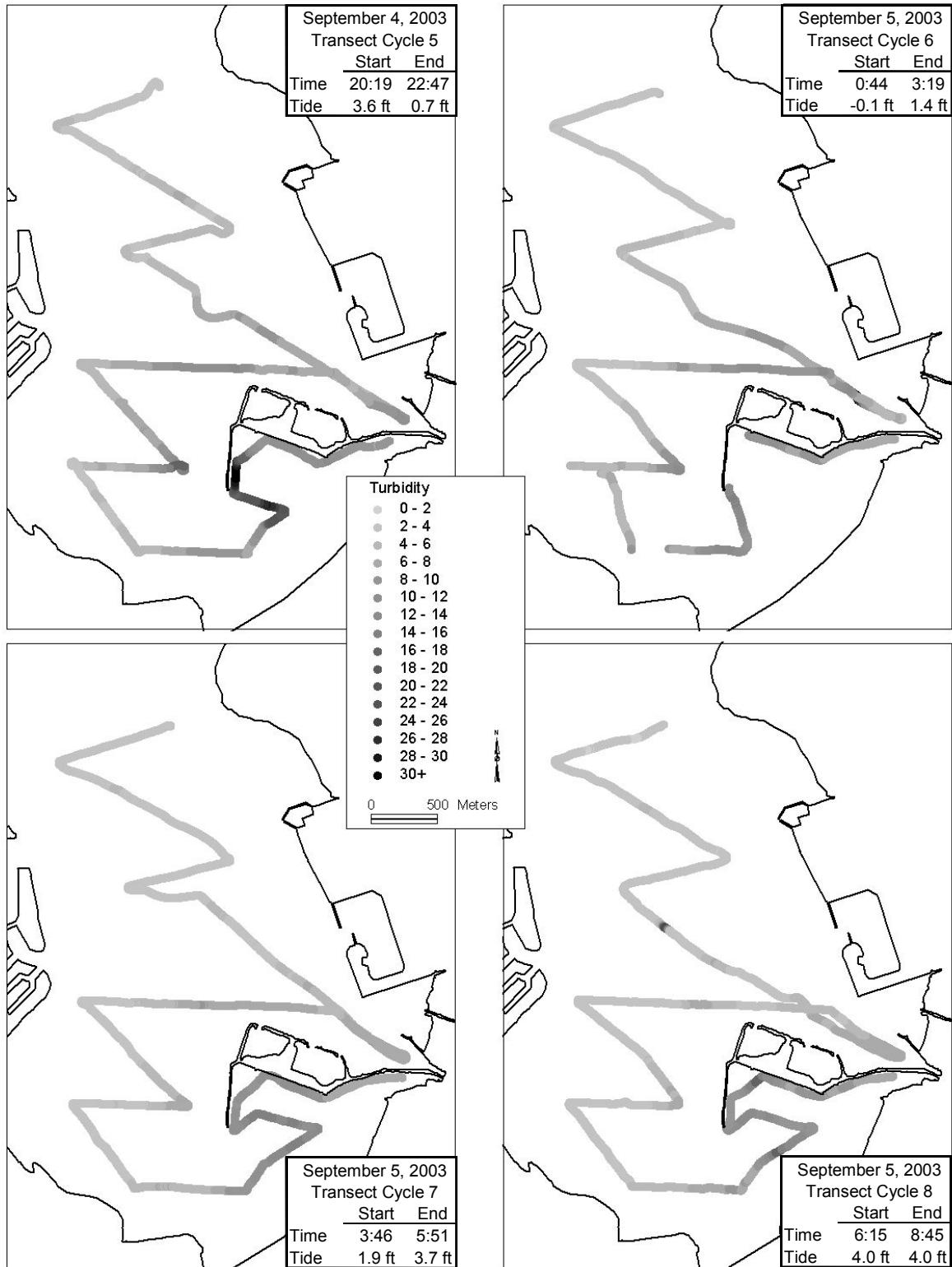


Figure H2. Results of towed turbidity data collection. Transect cycles 4 through 8, September 4&5, 2003. Times are Pacific Daylight Time.

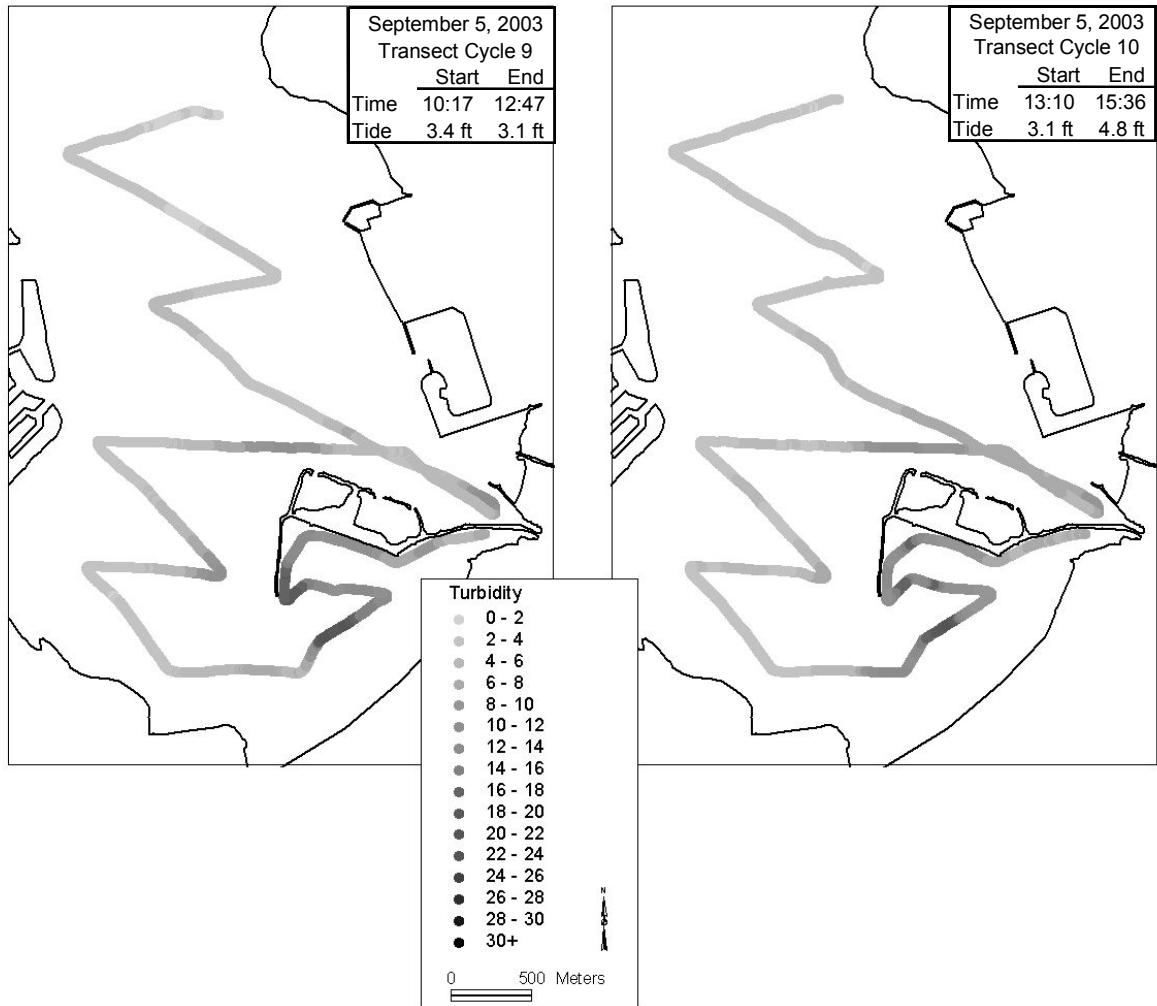


Figure H3. Results of towed turbidity data collection. Transect cycles 9 and 10, September 5, 2003. Times are Pacific Daylight Time.

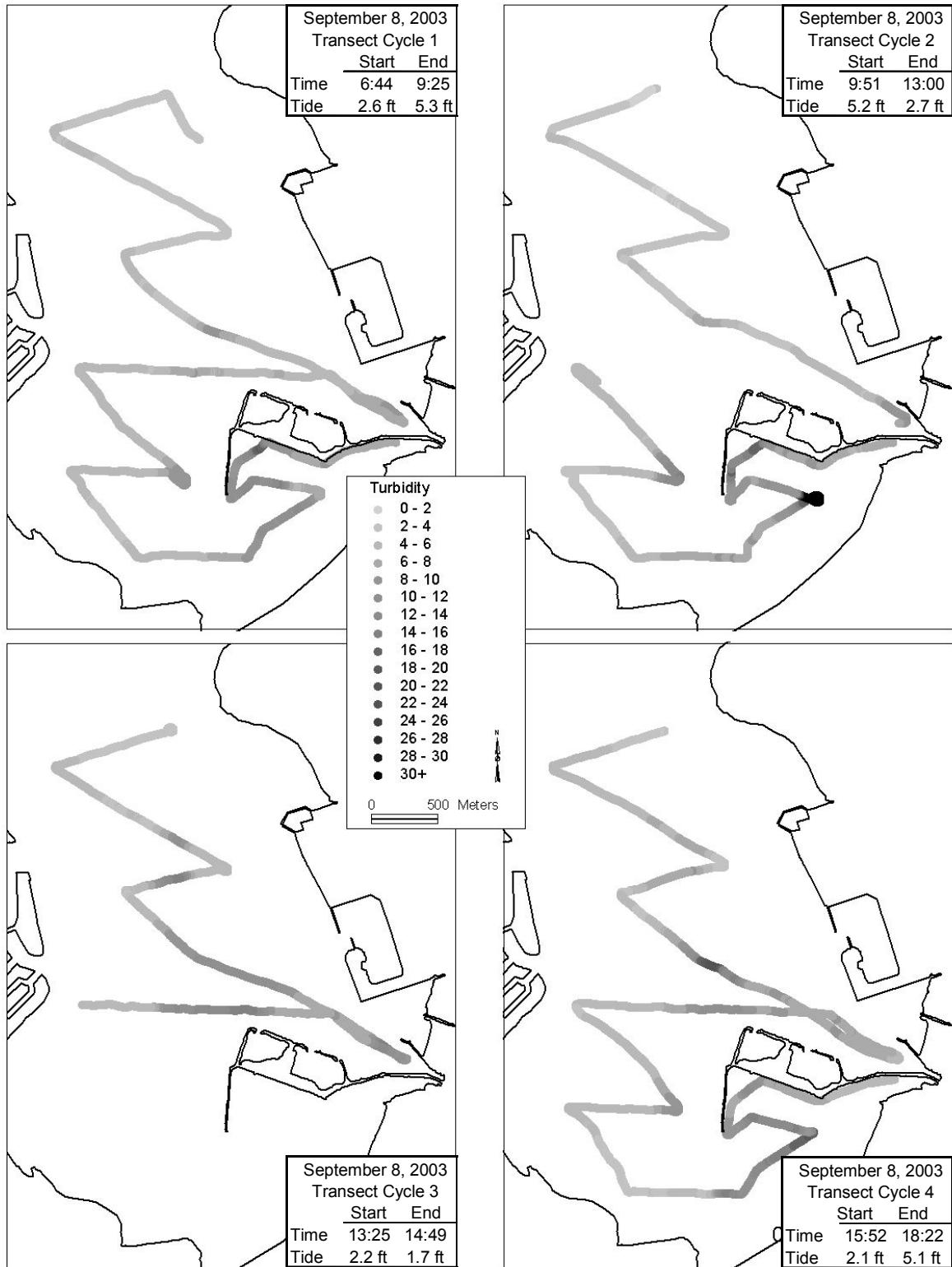


Figure H4. Results of towed turbidity data collection. Transect cycles 1 through 4, September 8, 2003. Times are Pacific Daylight Time.

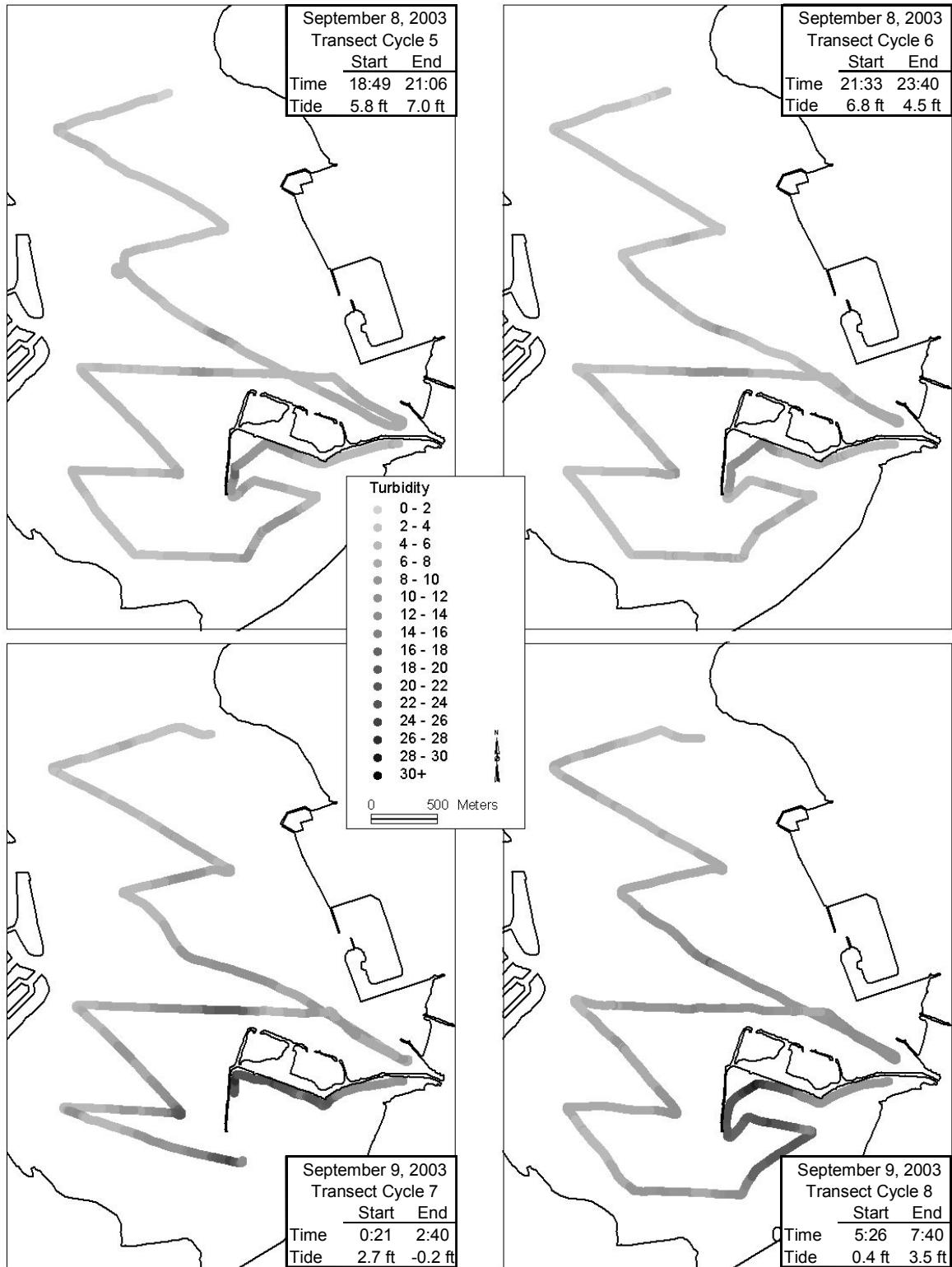


Figure H5. Results of towed turbidity data collection. Transect cycles 5 through 8, September 8&9, 2003. Times are Pacific Daylight Time.

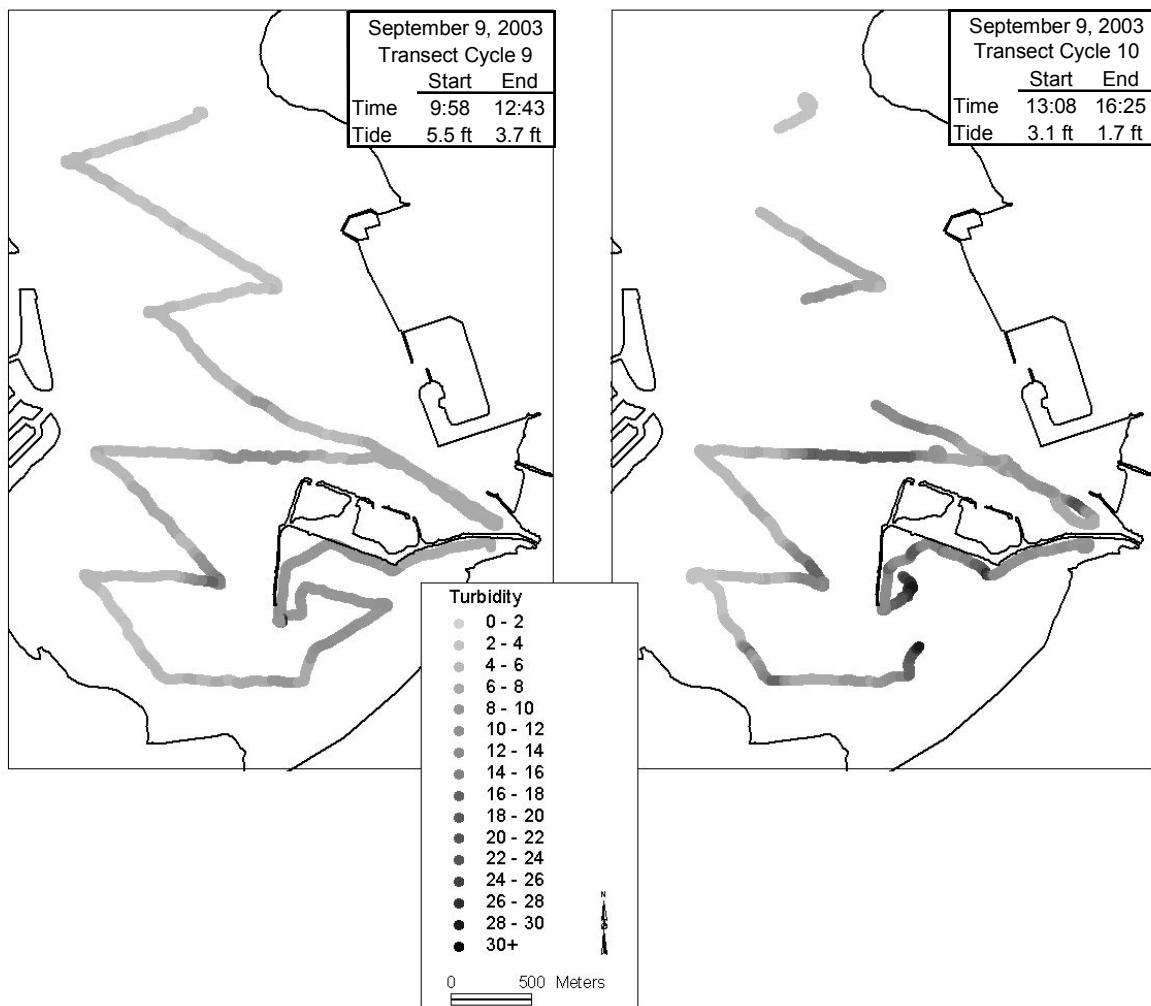


Figure H6. Results of towed turbidity data collection. Transect cycles 9 and 10, September 9, 2003. Times are Pacific Daylight Time.

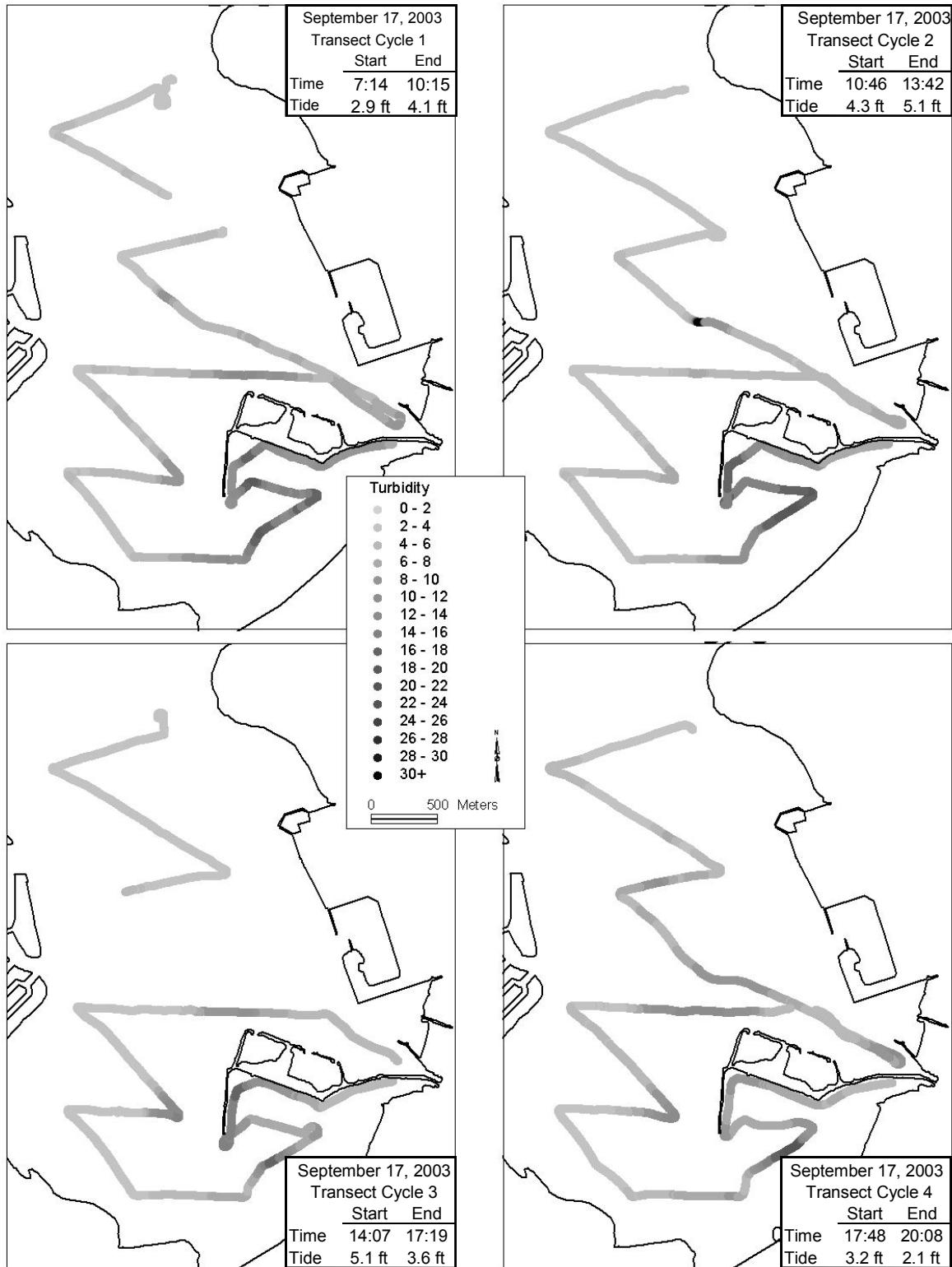


Figure H7. Results of towed turbidity data collection. Transect cycles 1 through 4, September 17, 2003. Times are Pacific Daylight Time.

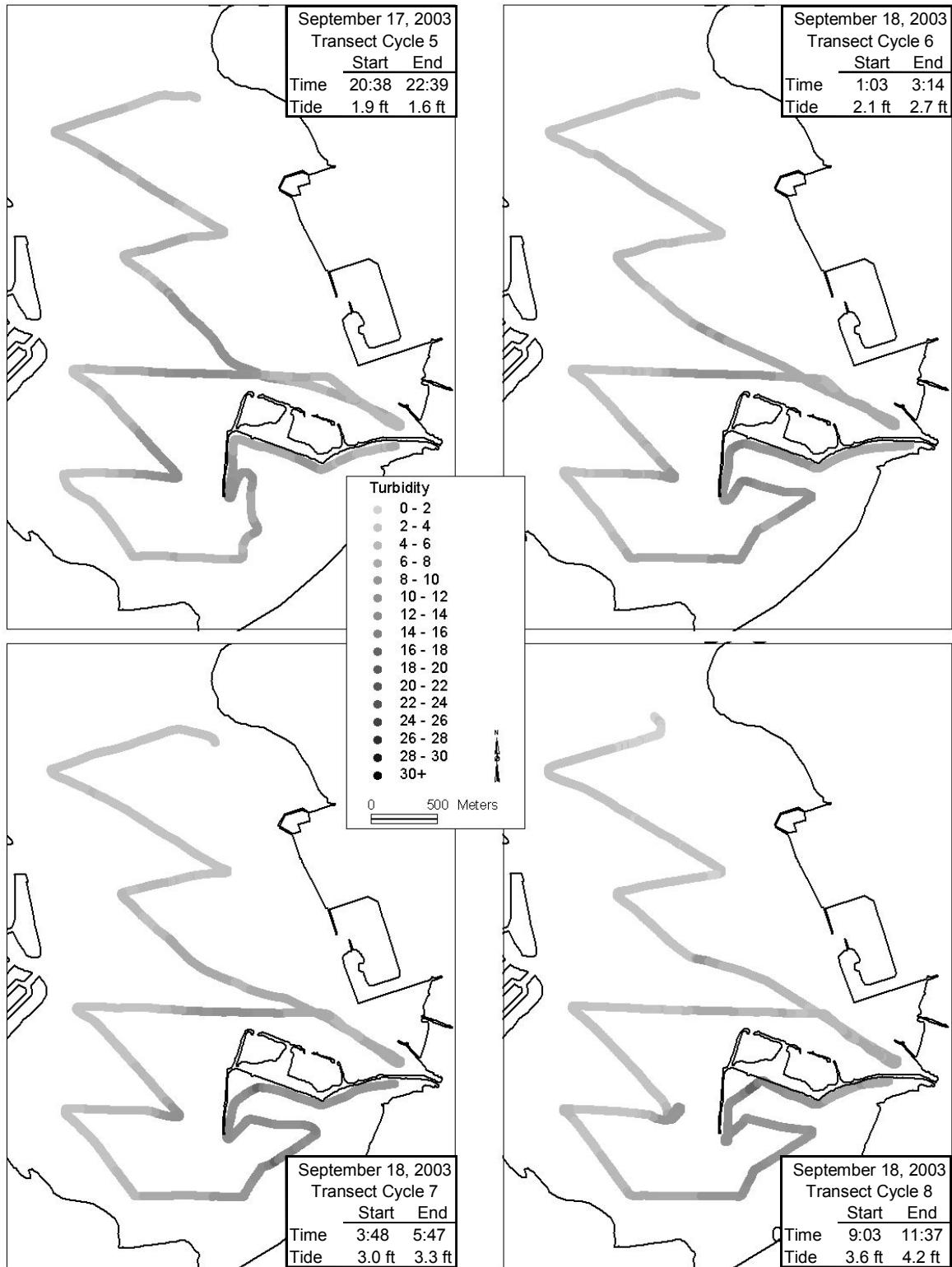


Figure H8. Results of towed turbidity data collection. Transect cycles 5 through 8, September 17&18, 2003. Times are Pacific Daylight Time.

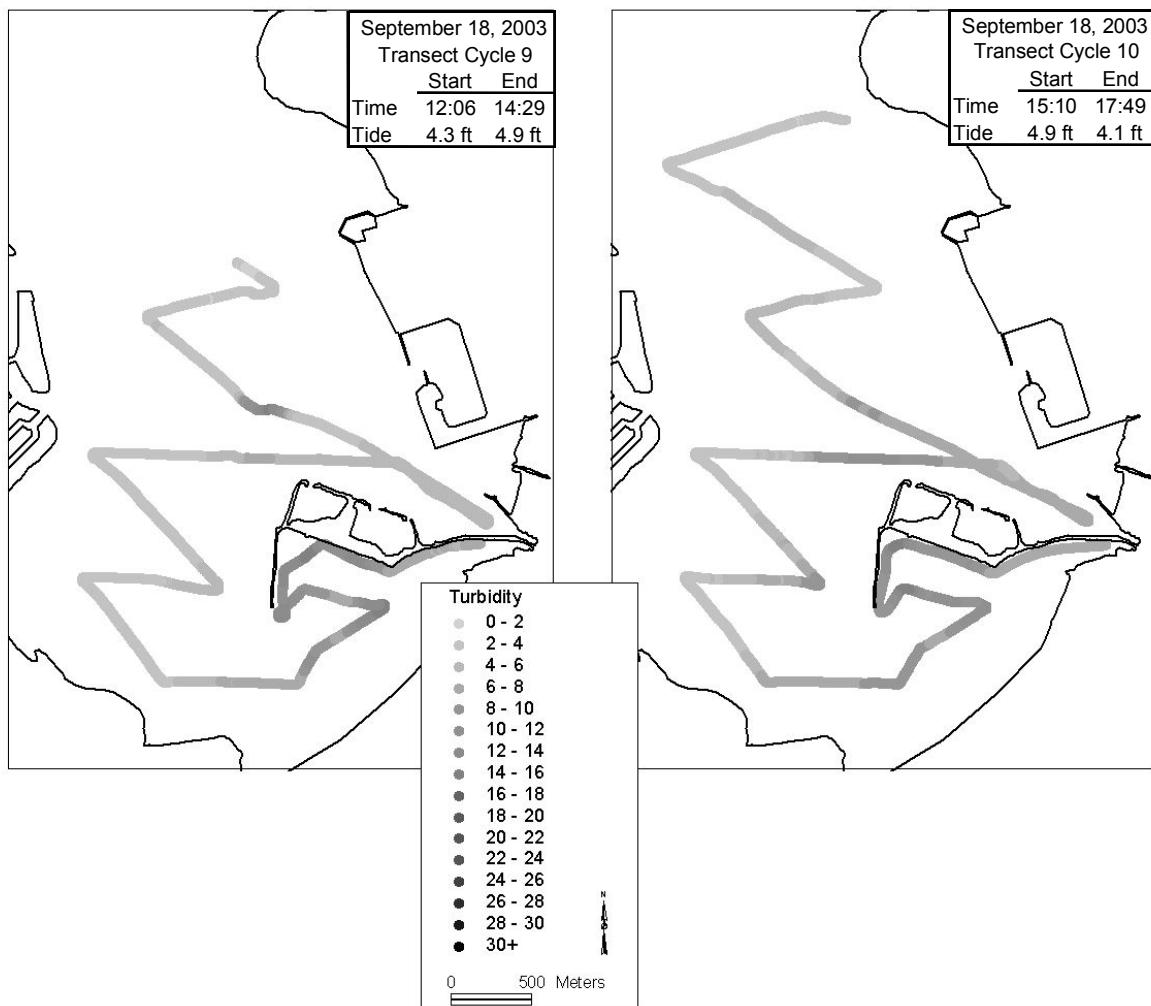


Figure H9. Results of towed turbidity data collection. Transect cycles 9 and 10, September 18, 2003.
Times are Pacific Daylight Time.

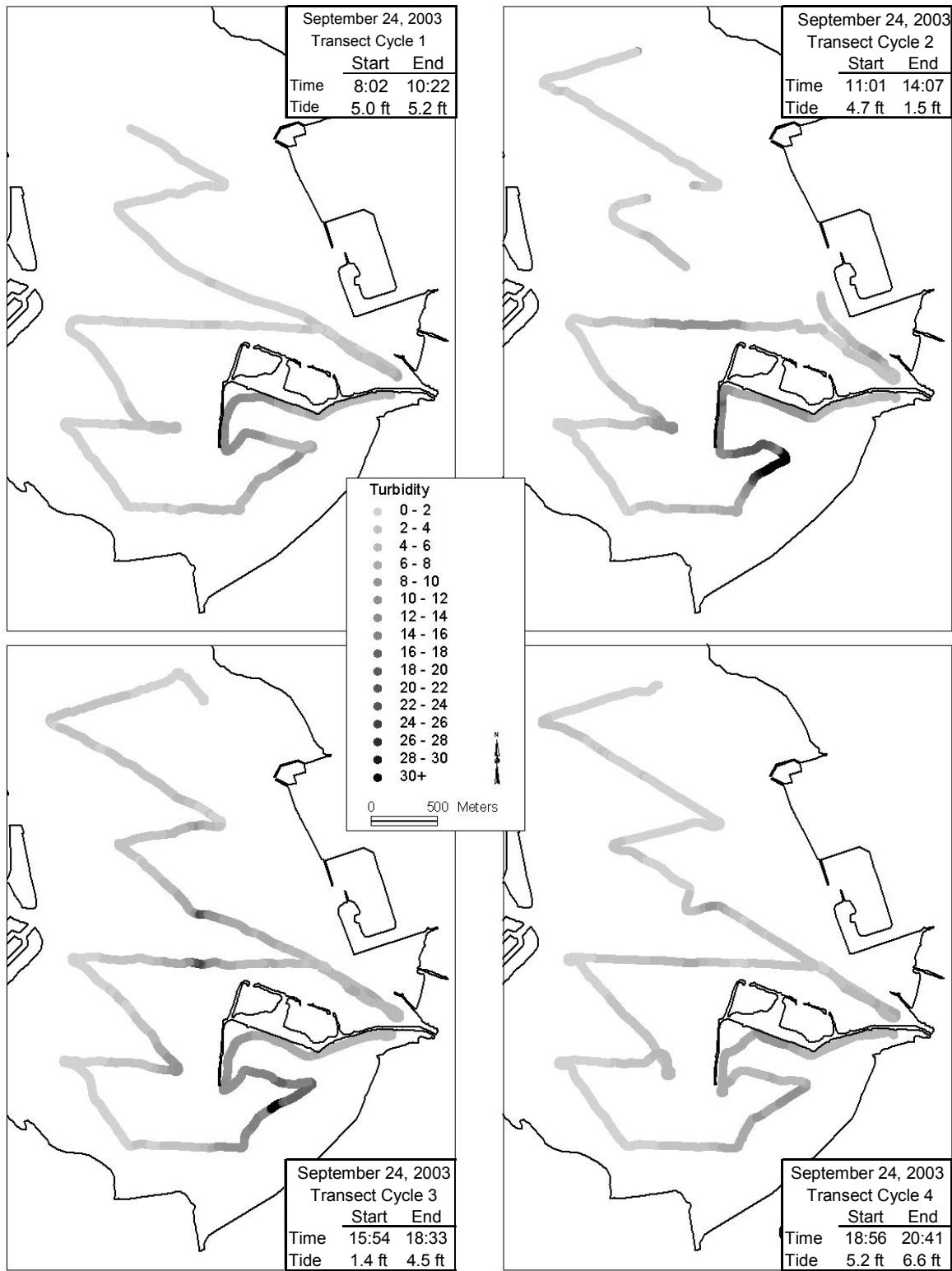


Figure H10. Results of towed turbidity data collection. Transect cycles 1 through 4, September 24, 2003. Times are Pacific Daylight Time.

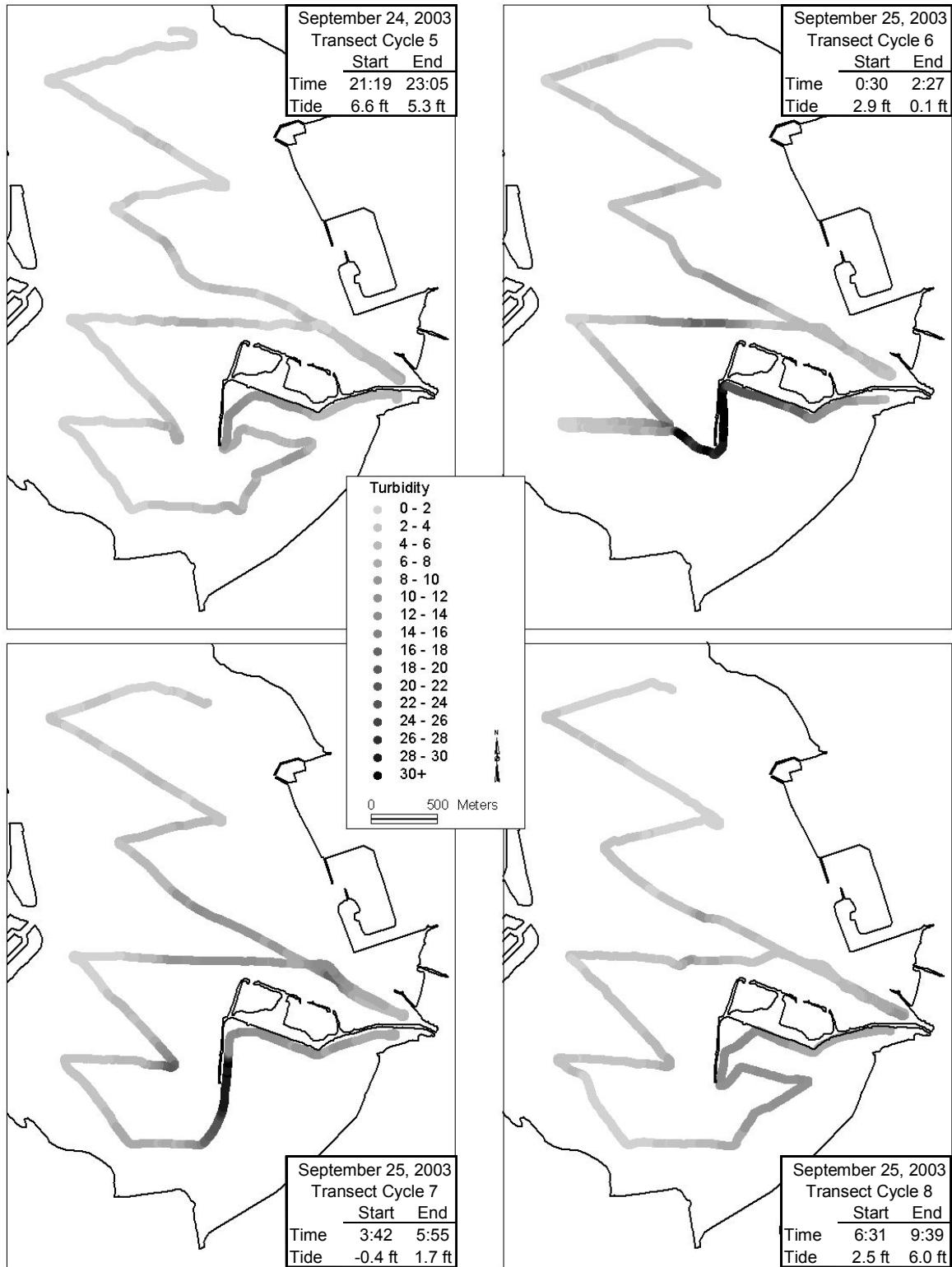


Figure H11. Results of towed turbidity data collection. Transect cycles 5 through 8, September 24&25, 2003. Times are Pacific Daylight Time.

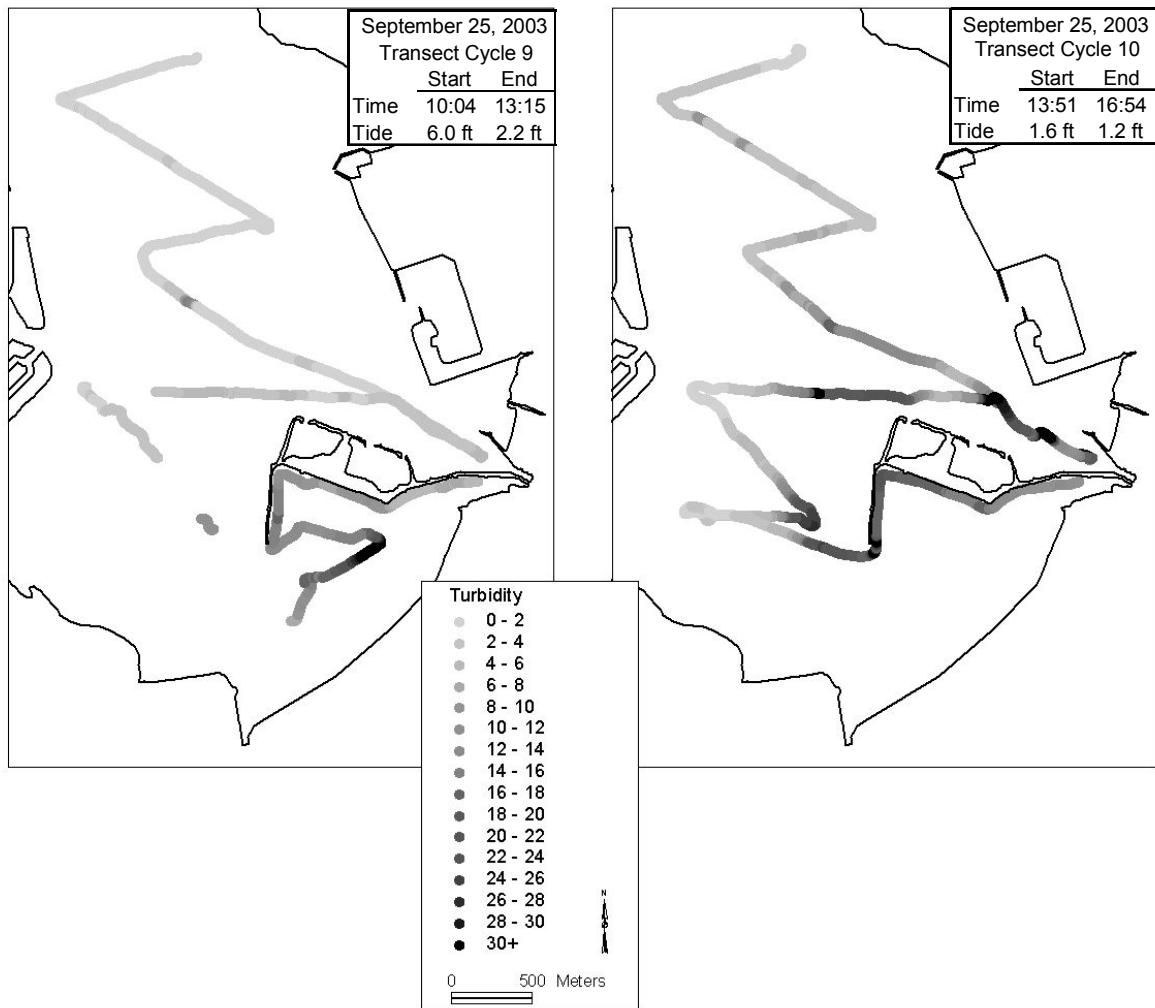


Figure H12. Results of towed turbidity data collection. Transect cycles 9 and 10, September 25, 2003. Times are Pacific Daylight Time.

South San Diego Bay Wind Monitoring

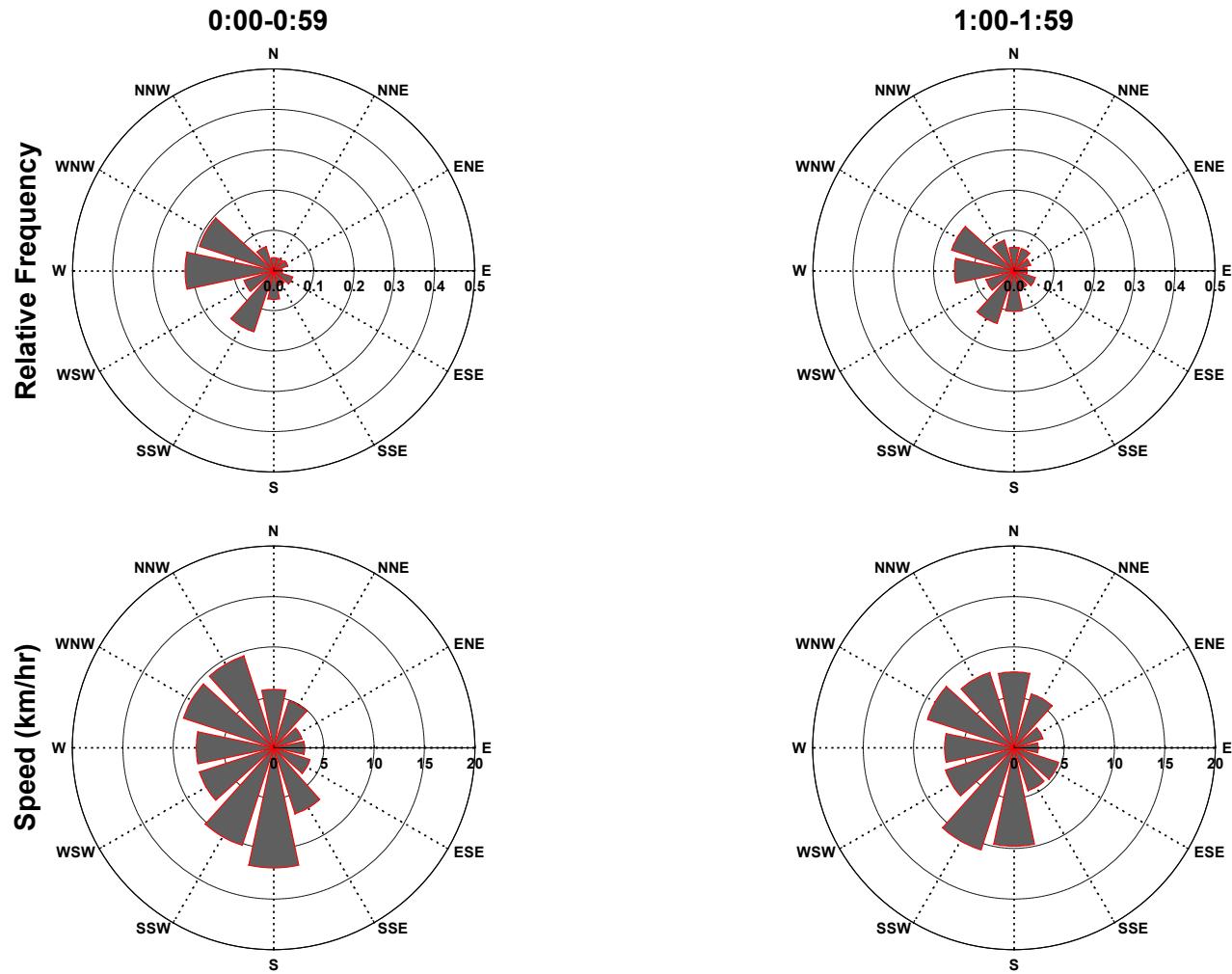


Figure H13. Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 0:00-0:59 (left) and 1:00-1:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

South San Diego Bay Wind Monitoring

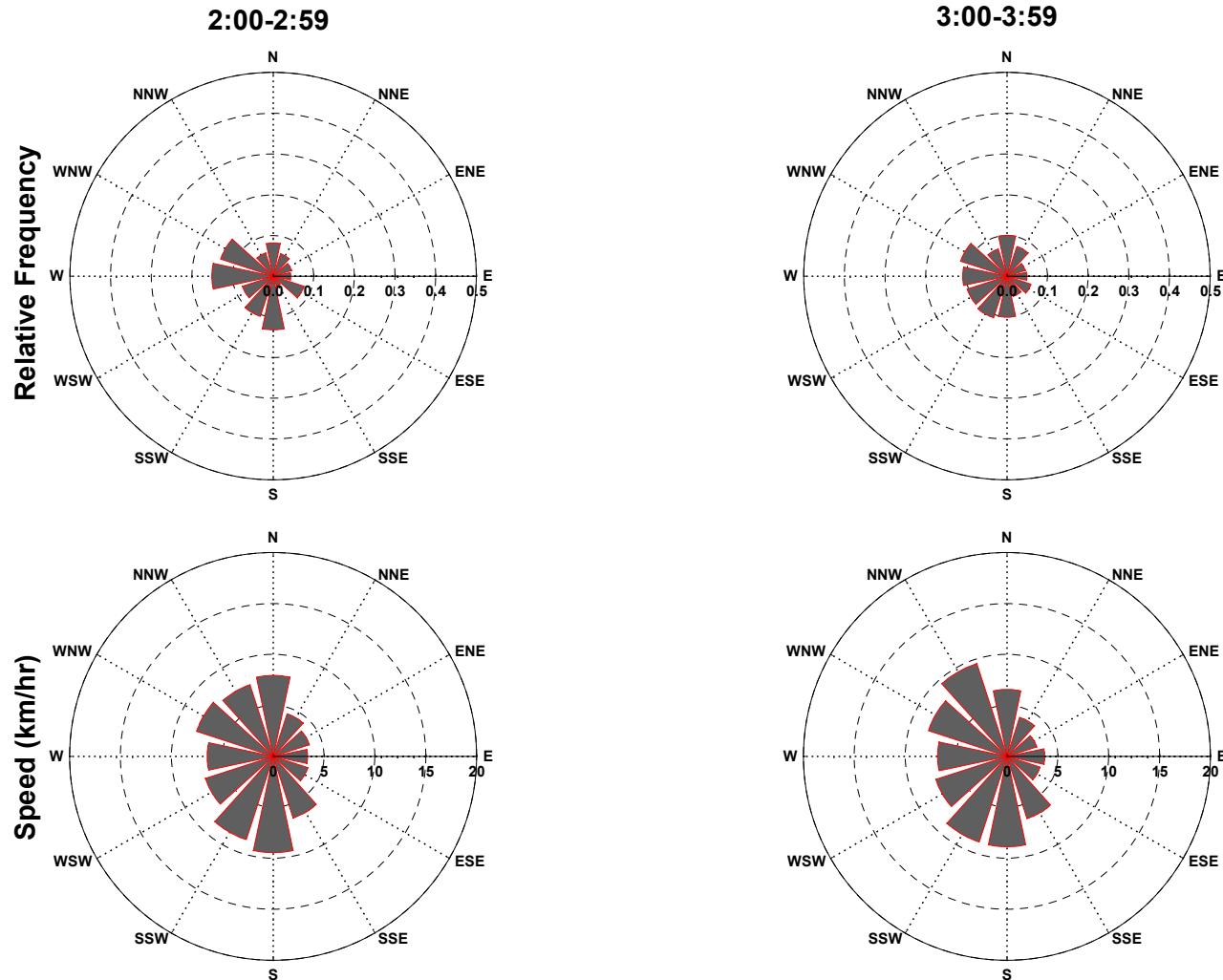


Figure H14. Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 2:00-2:59 (left) and 3:00-3:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

South San Diego Bay Wind Monitoring

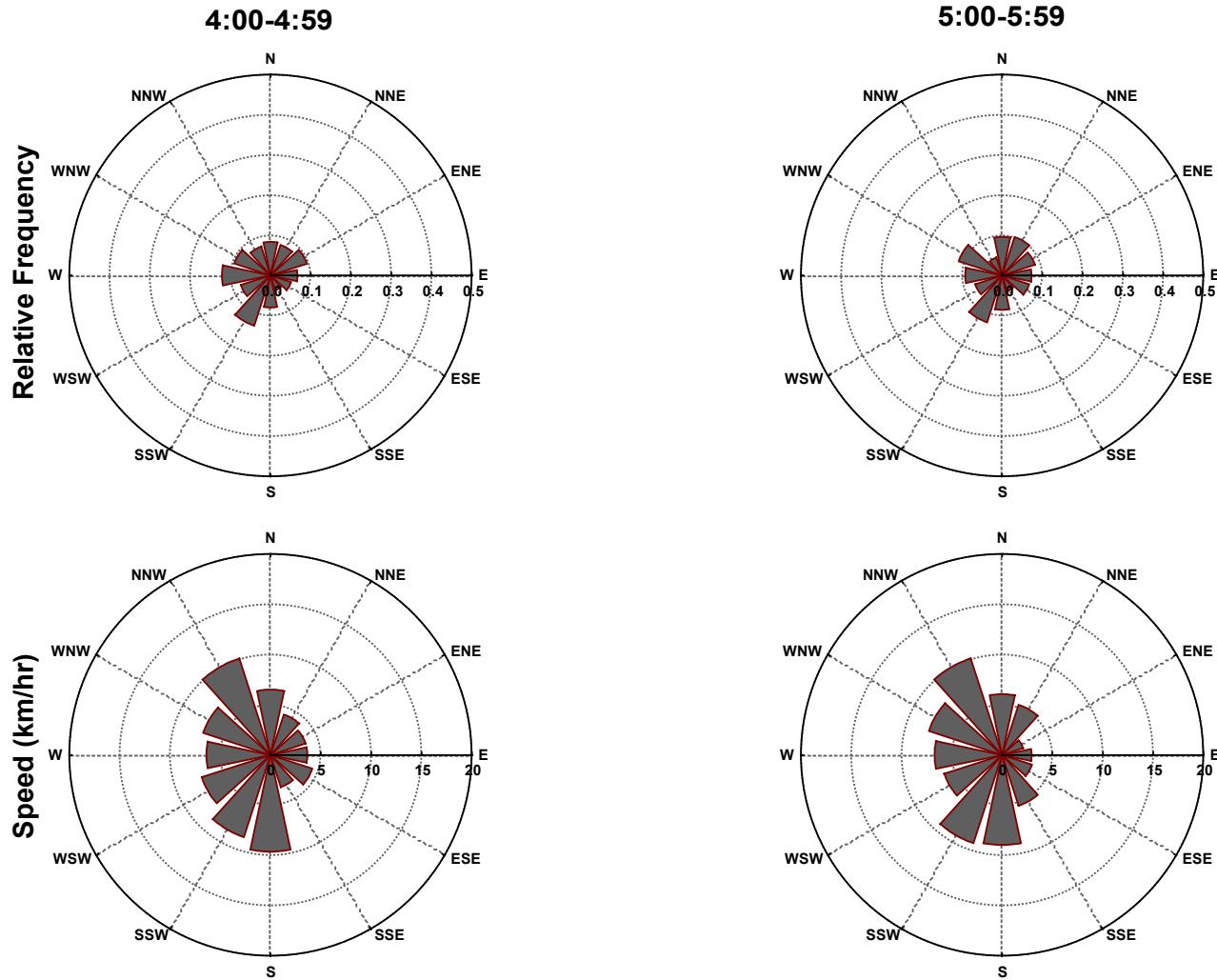


Figure H15. Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 4:00-4:59 (left) and 5:00-5:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

South San Diego Bay Wind Monitoring

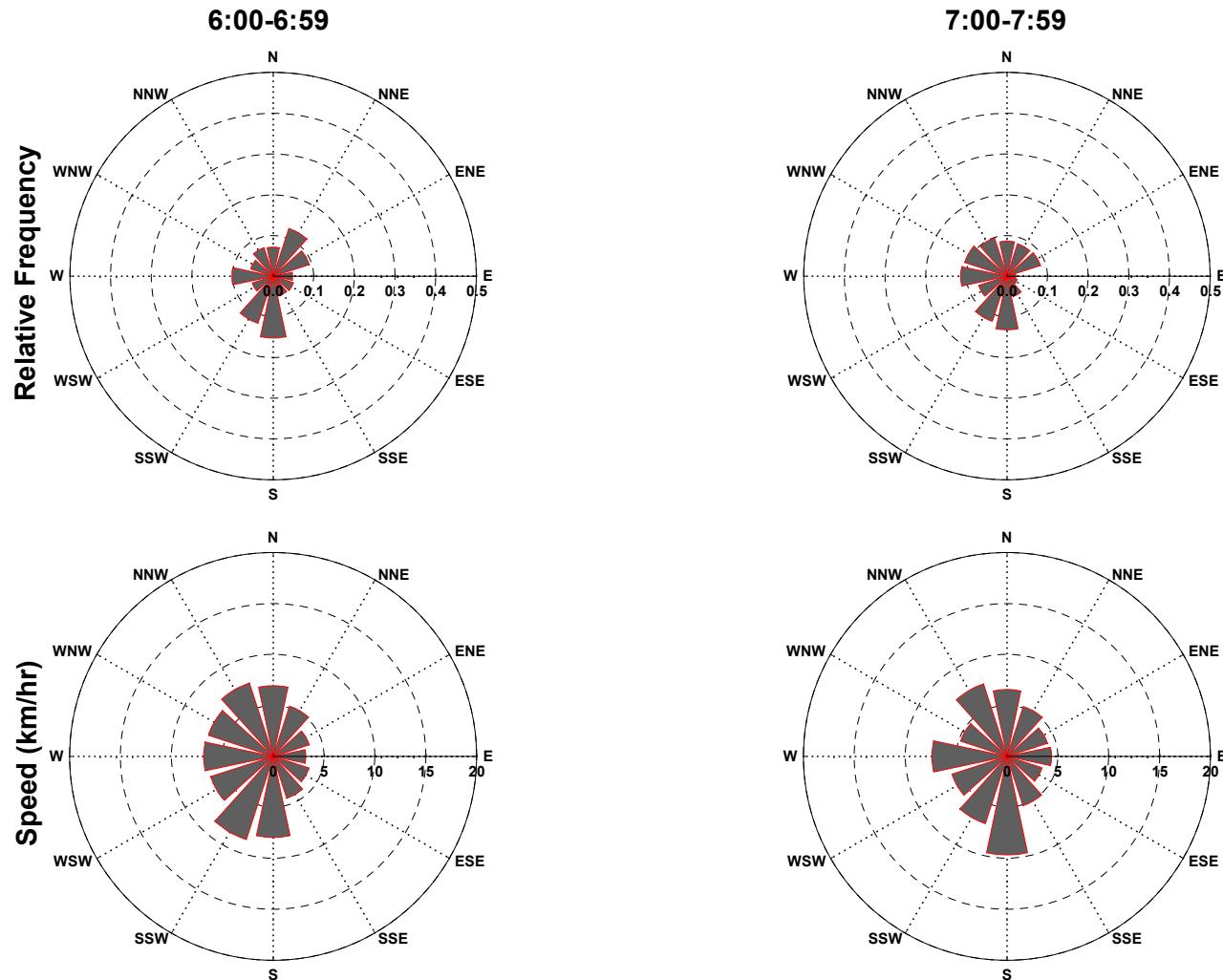


Figure H16. Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 6:00-6:59 (left) and 7:00-7:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

South San Diego Bay Wind Monitoring

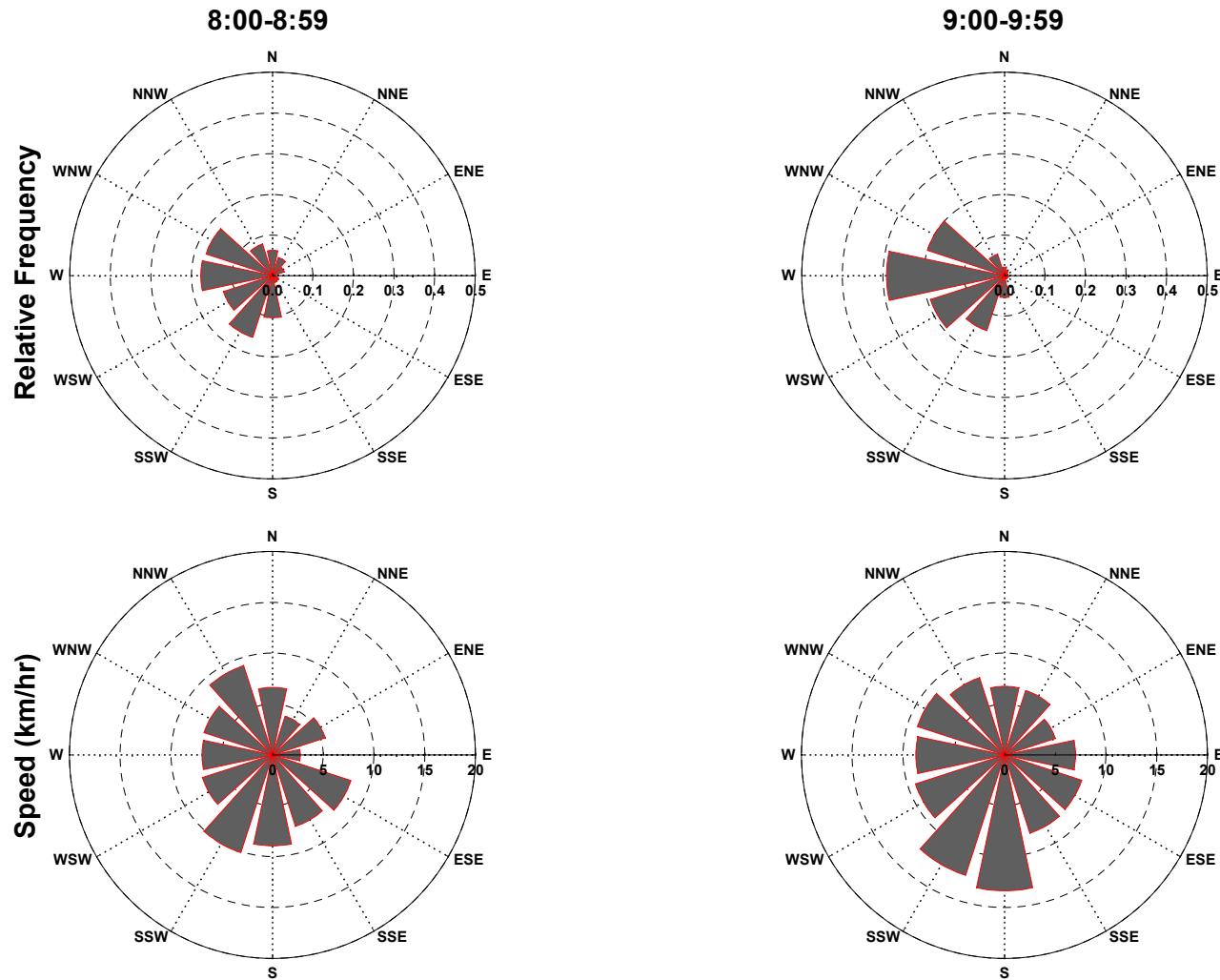


Figure H17. Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 8:00-8:59 (left) and 9:00-9:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

South San Diego Bay Wind Monitoring

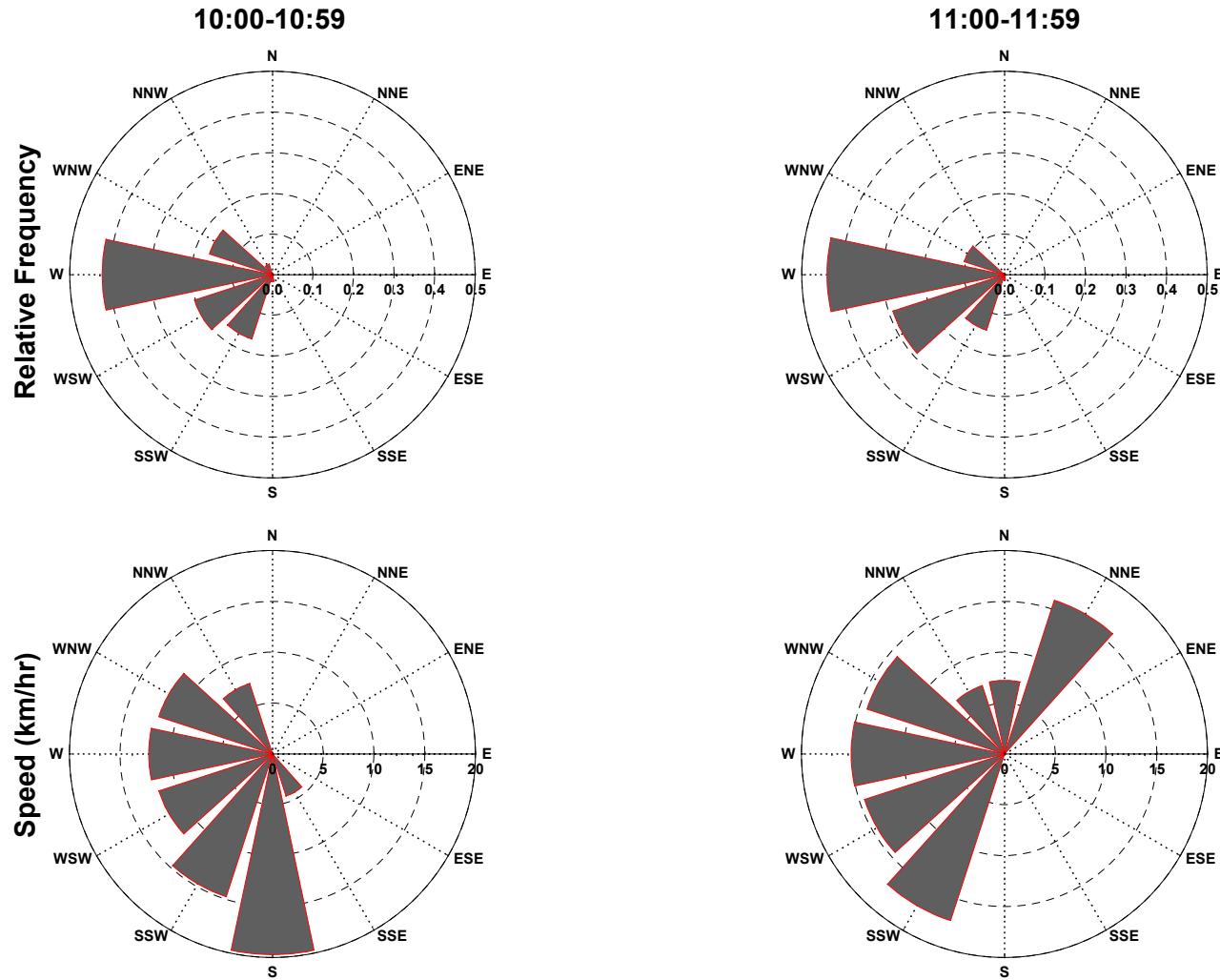


Figure H18. Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 10:00-10:59 (left) and 11:00-11:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

South San Diego Bay Wind Monitoring

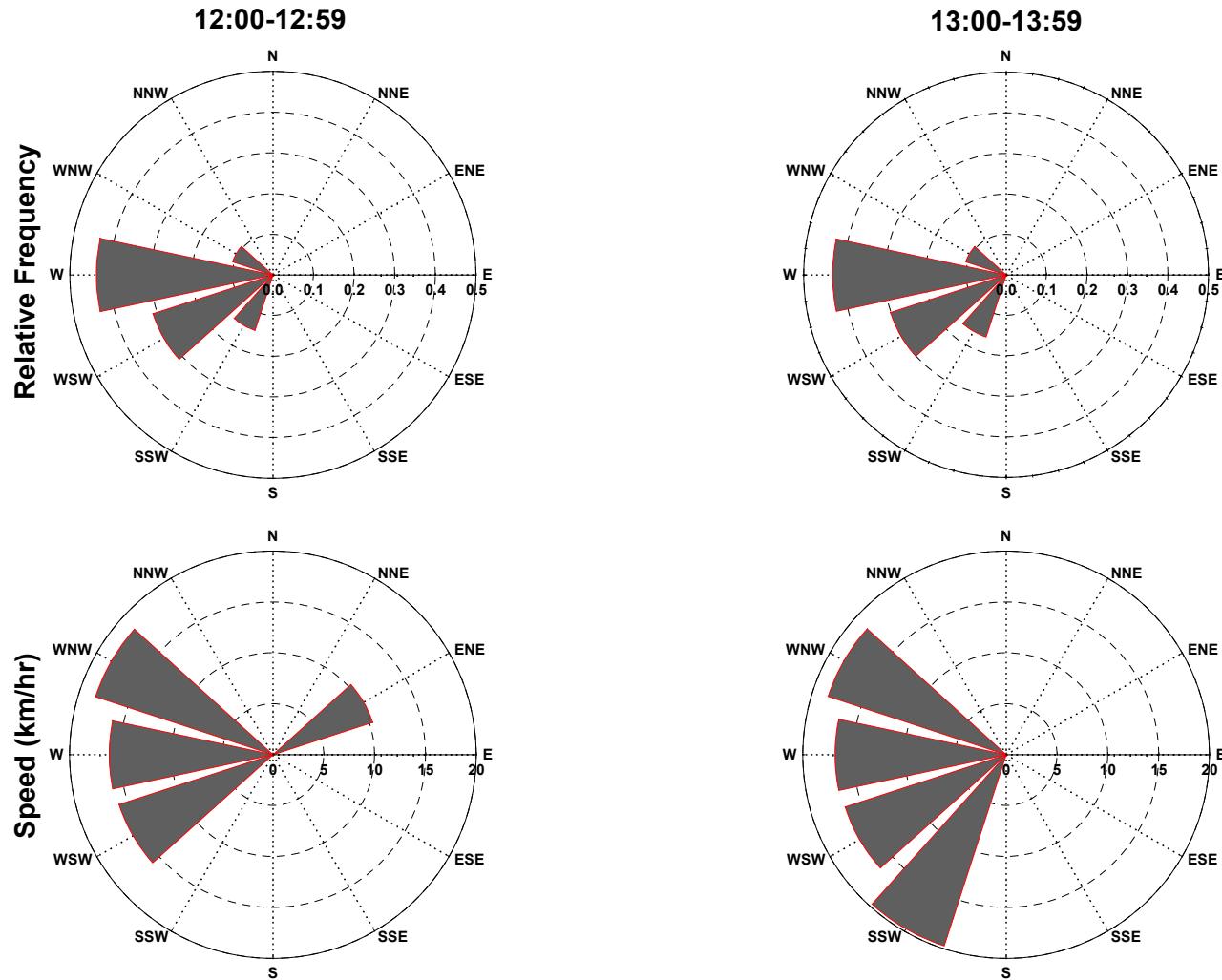


Figure H19. Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 12:00-12:59 (left) and 13:00-13:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

South San Diego Bay Wind Monitoring

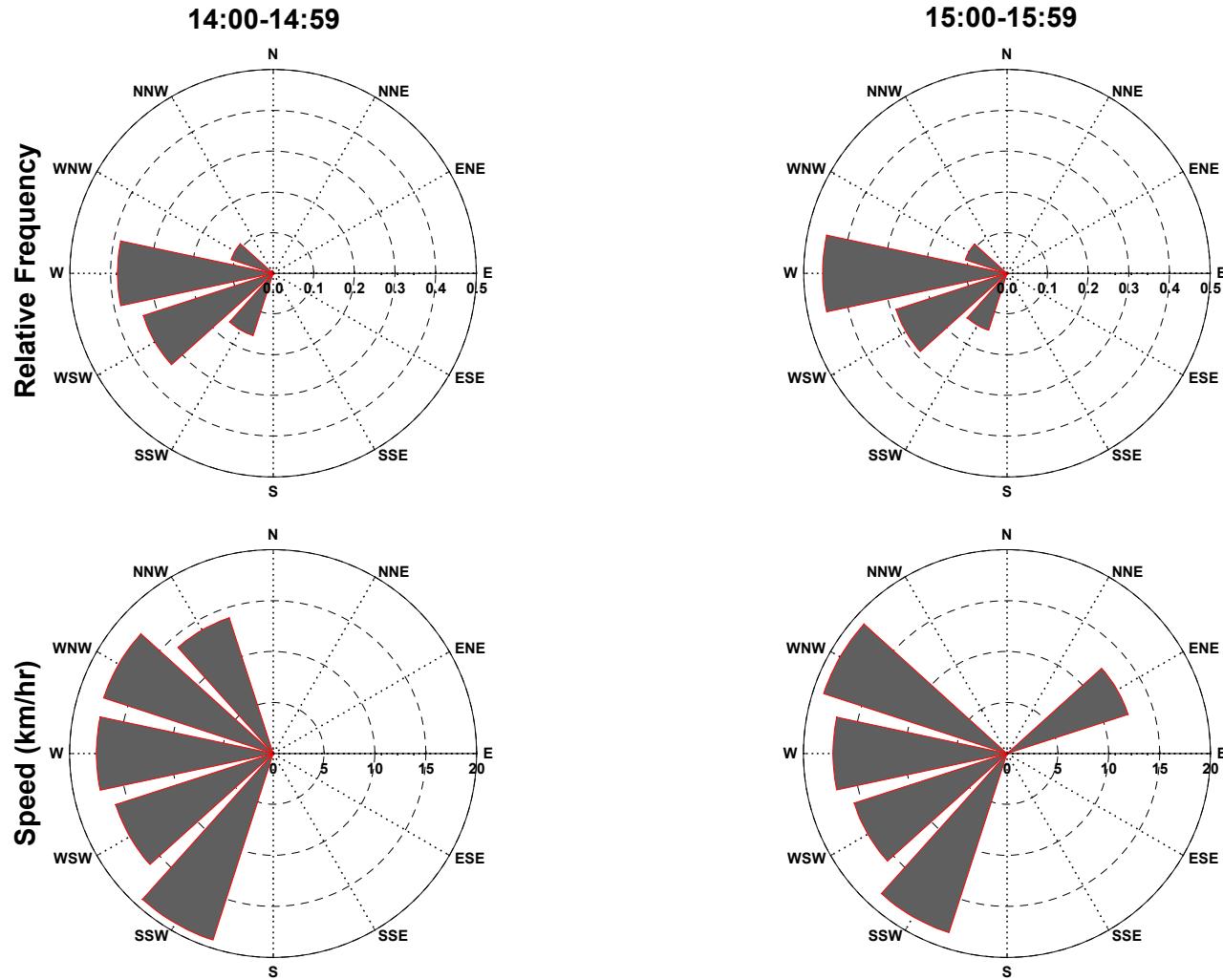


Figure H20. Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 14:00-14:59 (left) and 15:00-15:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

South San Diego Bay Wind Monitoring

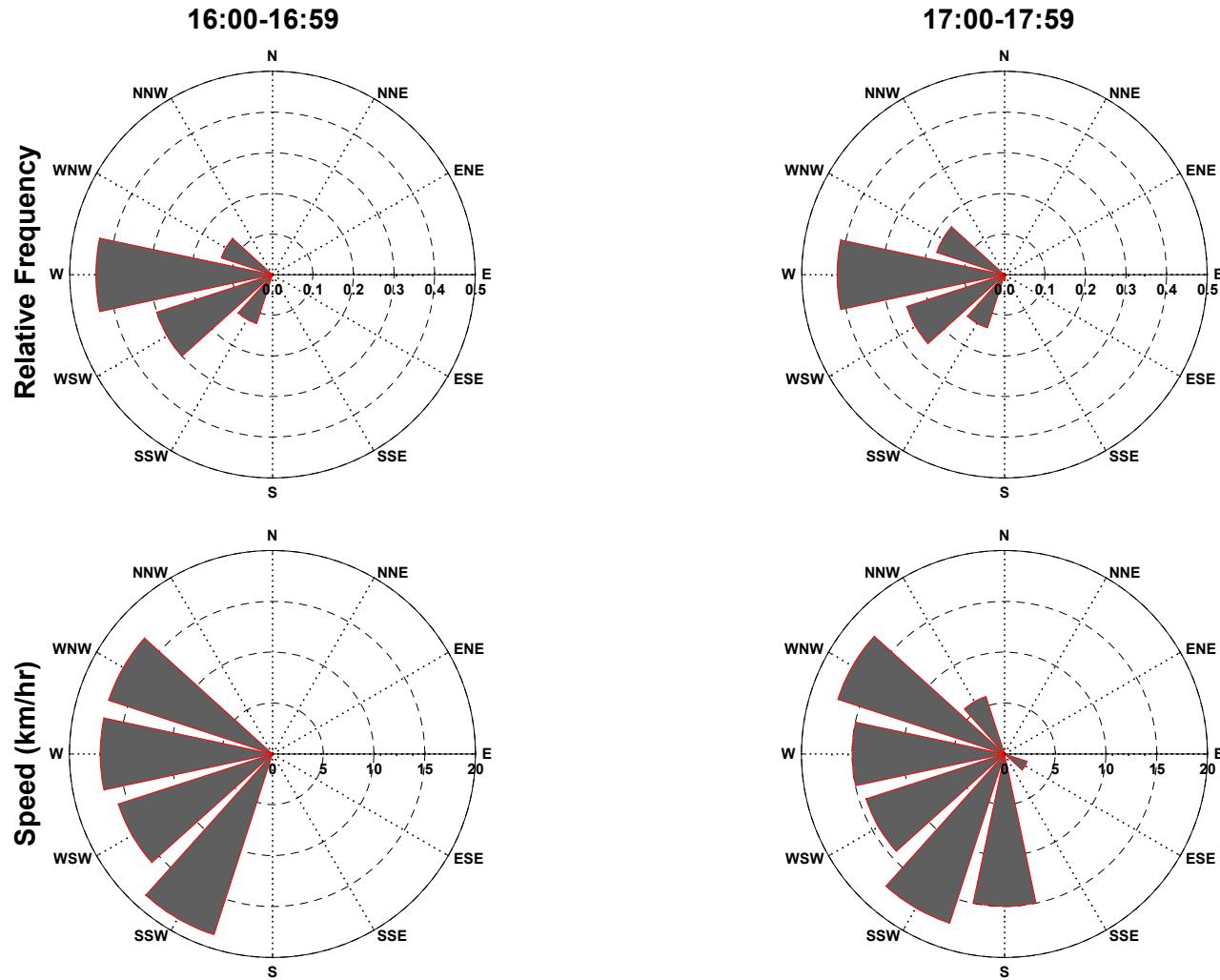


Figure H21. Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 16:00-16:59 (left) and 17:00-17:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

South San Diego Bay Wind Monitoring

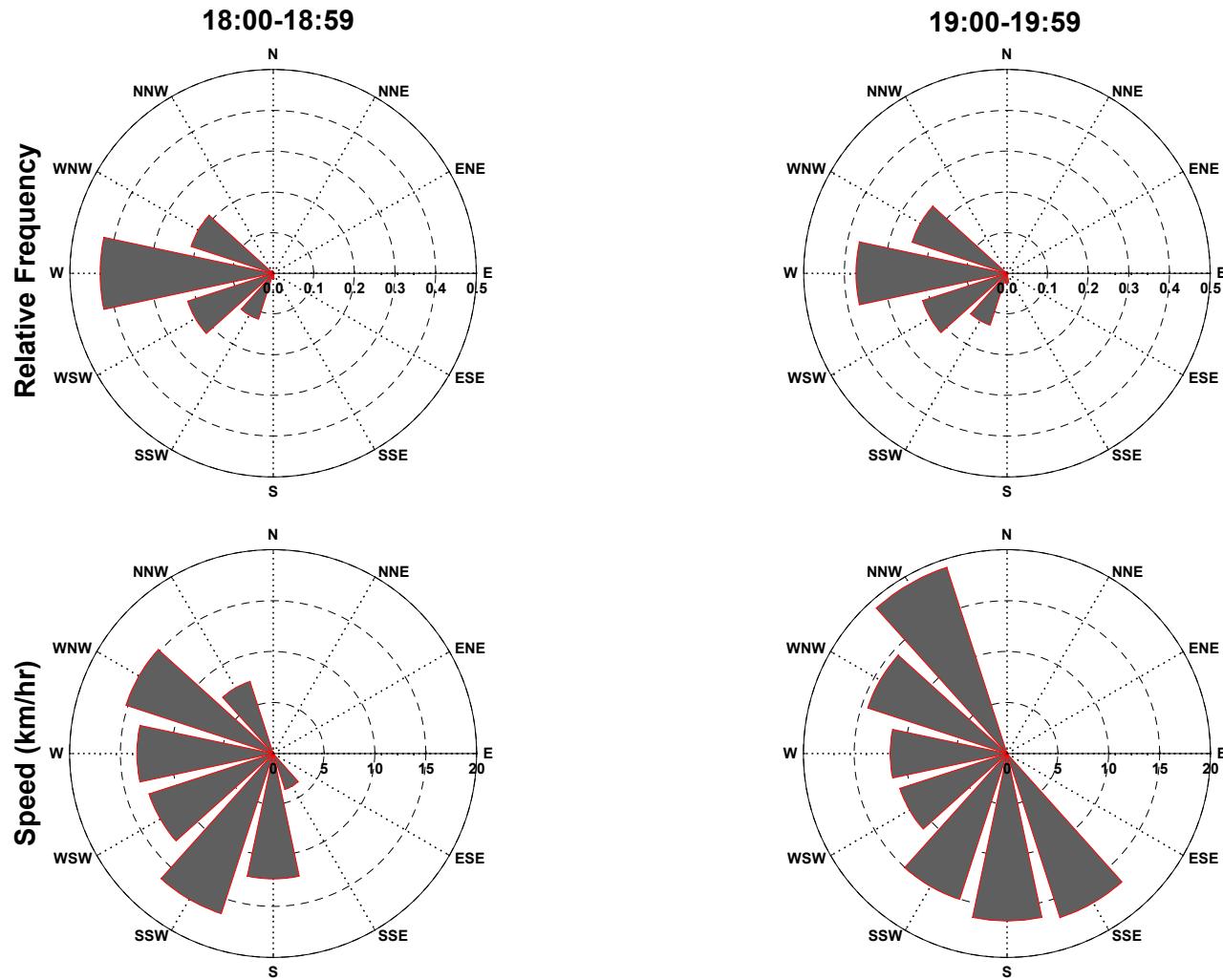


Figure H22. Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 18:00-18:59 (left) and 19:00-19:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

South San Diego Bay Wind Monitoring

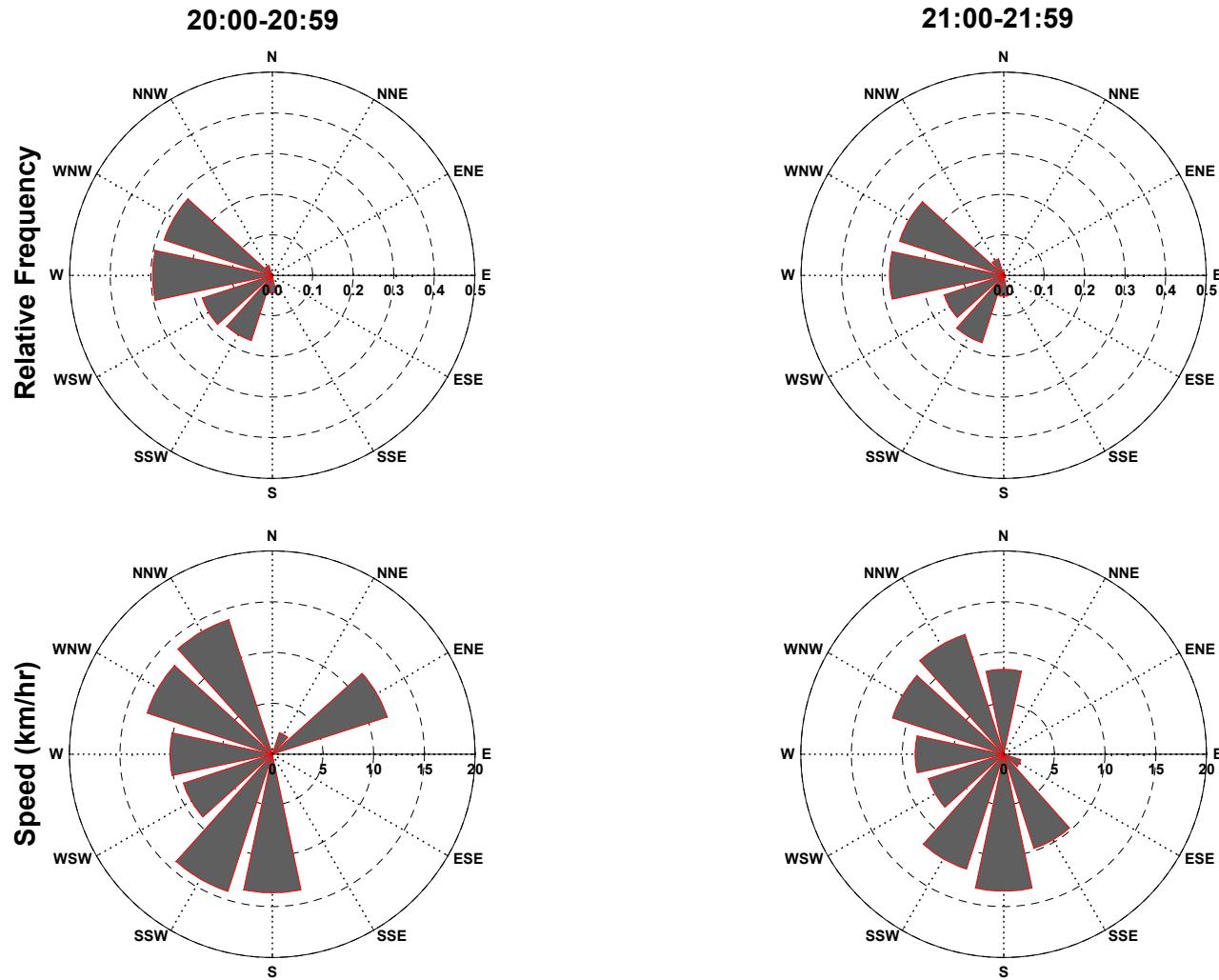


Figure H23. Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 20:00-20:59 (left) and 21:00-21:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

South San Diego Bay Wind Monitoring

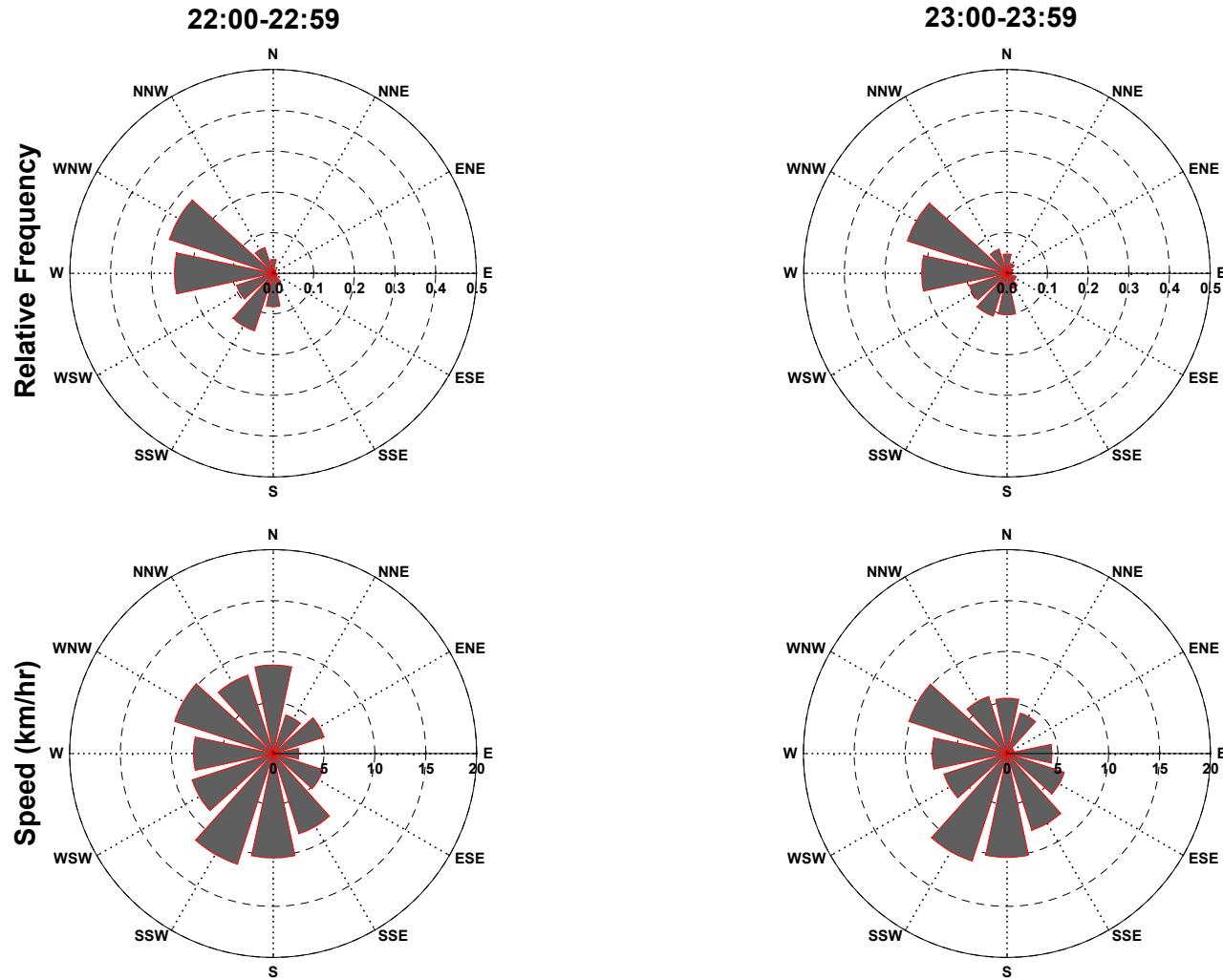


Figure H24. Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 22:00-22:59 (left) and 23:00-23:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

Appendix I

Benthic Invertebrate Monitoring Data

Table I1. Benthic invertebrate counts at subtidal stations in south San Diego Bay, Survey SBPPTE001 (Replicate A), July 2003.

Taxon	Total Count	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5
Annelida																						
<i>Armandia brevis</i>	26		3							3			3				2	12	1	2		
<i>Brania medioidentata</i>	4	1											1		1		1					
<i>Capitella capitata</i>	30						2		8	4	2	1						2	4	4	1	1
Cirratulidae	2				1				1													
<i>Cirriformia moorei</i>	2											1										1
<i>Cossura pygodactylata</i>	2															2						
<i>Diplocirrus</i> sp. SD1	4				1						1						2					
<i>Dorvillea (Schistomeringsos)</i> sp.	8	1	1	1	1													4				
<i>Eteone aestuarina</i>	15											1		3		2		5	1	1	1	1
<i>Euchone limnicola</i>	4	1	1			1																1
<i>Exogone louveri</i>	108	16		1						6			42				17	26				
<i>Exogone</i> sp. 1	160	3	28	7	7	3	2	3	1	3		2		31	2		13	4	35	6	7	3
<i>Fabricinuda limnicola</i>	111		7	4	26	7			10		1	7		8		15	22		3	1		
<i>Glycera americana</i>	4				1								1		1			1				
<i>Harmothoe imbricata</i> complex	1								1													
<i>Leitoscolopios pugettensis</i>	234	7	26	47	7	2	2		20	5		3	21	27	25	33	7					2
<i>Mediomastus</i> sp.	1,144	60	80	64	37	40	8	1	56	6	10	88	61	89	91	228	213	4		1	3	4
<i>Megalomma pigmentum</i>	89		7	6	2	3	3		9	1		3	47	1	6	1						
<i>Monticellina</i> sp.	2														2							
<i>Neanthes acuminata</i> complex	73	1				1	4	10	1	15		1	2				9	18	6	2	1	2
<i>Neanthes</i> sp.	16										1						1	14				
<i>Odontosyllis phosphorea</i>	13		3									6		1				1	1			1
<i>Pionomis</i> sp. SD1	2									2												
<i>Pista agassizi</i>	25	6	15							2			2									
<i>Polydora cornuta</i>	1									1												
<i>Prionospio heterobranchia</i>	77	20	8	1		3	1		1			23		7	2	4	2	2	4			1
<i>Pseudopolydora paucibranchiata</i>	10	1	1			1			2	1							2	2				
<i>Rhynchospio glutaea</i>	14									1					1		5			7		
<i>Scolelepis</i> sp.	7				1	1	3													2		
<i>Scoletoma</i> sp. A	1	1																				
<i>Scoletoma</i> sp. B	1														1							
<i>Scoletoma</i> sp. C	139	28	23	4	5	1			1	1				36	8	12	7	5	7			1
<i>Scoletoma tetraura</i> complex	2	2																				
<i>Scoloplos acmeeceps</i>	29							1	5		1	3							10	8	1	
<i>Scyphoprocus oculatus</i>	17									10			1					6				
<i>Spiophanes duplex</i>	1															1						
<i>Streblospio benedicti</i>	39					3			1		3		12									33
<i>Timarete</i> sp.	13																					

(continued)

Table I1(continued). Benthic invertebrate counts at subtidal stations in south San Diego Bay, Survey SBPTE001 (Replicate A), July 2003.

Taxon	Total	Count	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5		
Arthropoda																									
<i>Acuminodeutopus heteroporus</i>	65	2							13	6				31		2	3	1					1	6	
<i>Amphideutopus oculatus</i>	10	1	1			2								4		2									
<i>Amphilochidae</i>	2													2											
<i>Amphilochus</i> sp.	1													1											
<i>Ampithoe</i> spp.	2													1											
<i>Aoridae</i>	11	6												2										3	
<i>Bemlos macromanus</i>	14		1																						
<i>Campylaspis rubromaculata</i>	2								1	1															
<i>Caprella californica</i>	28								2					1											
<i>Caprella mendax</i>	1													1											
<i>Caprella</i> spp.	3													1											
<i>Corophium</i> sp.	86										68			4									14		
<i>Cumella</i> sp. D	2		1																					1	
<i>Elasmopus</i> spp.	3																							3	
<i>Erichthonius brasiliensis</i>	7													5										2	
<i>Erichthonius difformis</i>	7													7											
<i>Erichthonius</i> sp.	1													1											
<i>Euphilomedes carcarodonta</i>	52								1	2				11										1	
<i>Heterophoxus</i> cf. <i>ellisi</i>	37											35		2											
<i>Heteroserolis carinata</i>	3								1					1											
<i>Hyale</i> sp.	6													1									2	3	
<i>Idotea</i> spp.	2																							2	
<i>Leptochelia dubia</i>	219		3									86	2	4			1	1	18	86	14		4		
<i>Leptochelidae</i>	45											22							1	7	14	1			
<i>Mayerella acanthopoda</i>	314	2	9	7	6	8	27	1			22	40	1	17	2	2	2	8	109	5		44	4		
<i>Monoculodes hartmanae</i>	24			5	2		3				2		4		2	4								1	
<i>Oxyurostylis pacifica</i>	15						1	7						1										4	2
<i>Paracerceis sculpta</i>	32		2											2											
<i>Parametopella</i> cf. <i>ninis</i>	5													5											
<i>Paranthuria elegans</i>	7											4	3												
<i>Parasterope bamesi</i>	53	2										3	34											1	
<i>Podocerus brasiliensis</i>	16													16											
<i>Podocerus</i> spp.	7		2											5											
<i>Rudilemboides stenopropodus</i>	36	2	3		1		3				13			1	1								4	2	
<i>Rutiderma judayi</i>	56			3	1						47		1	2									2		
<i>Rutiderma rostratum</i>	6		1									3												2	
<i>Rutiderma</i> sp.	23										2	21			1	1									
<i>Synchelidium rectipalmum</i>	2																								

(continued)

Table I1(continued). Benthic invertebrate counts at subtidal stations in south San Diego Bay, Survey SBPPTE001 (Replicate A), July 2003.

Taxon	Total Count	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5
Molluscs																						
<i>Acteocina inculta</i>	17	1	2					7				6										1
<i>Barleeia</i> sp./ <i>Assiminea californica</i>	3							1				1										
<i>Crucibulum spinosum</i>	6								1			5										
<i>Lottia depicta</i>	1																				1	
<i>Lyonsia californica</i>	25				1		1	4			2	1	1		6				5		4	
<i>Musculista senhousia</i>	173	30	43		2	5	1	70			1	7	2	1	2	2		5	1		1	
<i>Solen rostriformis</i>	27		2		2	5					2		7	1	3		4		1			
<i>Tellina meropsis</i>	70		7	6	3	2	2	3	6	4	10	3	1	1	1	2	13	3		2	1	
<i>Theora lubrica</i>	4		1					1				1			1							
<i>Thracia curta</i>	1														1							
Other Taxa																						
<i>Amphipholis squamata</i>	26				1	1					5		7	6				6				
<i>Amphiuridae</i> (juv.)	4				1								2					1				
<i>Anoplodactylus viridintestinalis</i>	1							1														
<i>Edwardsia californica</i>	3	2	1																			
<i>Leptosynapta</i> spp.	1						1															
Nematoda	1,306	63	175	30	1	19	17	657	9	8	20	8	6	88	14	97	84	2	2	4	2	
Nemertea unid.	14								5	1		3			1	3					1	
Oligochaeta	257	4	1	13	1	5	9	18	10	2	5	9	7	7	5	56	34	34	2	11	24	
Phoronida unid.	7		1		2	1												2			1	
<i>Scolanthus</i> sp. B	2	1	1																			
Total:	5,583	264	460	206	117	117	135	965	378	77	196	309	110	364	167	511	600	296	93	21	103	94

Table I2. Benthic invertebrate counts at intertidal stations in south San Diego Bay Survey SBPPTE001 (Replicate A), July 2003.

Taxon	Total Count	IR1	IR2	IR3	IR4	IR5	IT1	IT2	IT3	IT4	IT5
Annelida											
<i>Boccardiella hamata</i>	2							2			
<i>Brania medioidentata</i>	8	4									
<i>Capitella capitata</i>	155		14	3	19	5	4	8	5		97
<i>Chrysopetalum occidentale</i>	1								1		
<i>Cirriformia moorei</i>	8						3		1	2	2
<i>Ctenodrilus serratus</i>	1							1			
<i>Eteone aestuarina</i>	4	1	1							1	1
<i>Eteone californica</i>	5	1			4						
<i>Euchone limnicola</i>	1				1						
<i>Exogone lourei</i>	10				7	3					
<i>Exogone</i> sp. 1	100	8	1	7	4	3	1	5	18	1	52
<i>Fabricinuda limnicola</i>	773	199	2	15	187	365	2	1			2
<i>Glycera americana</i>	3	1		1				1			
<i>Leitoscolopios pugettensis</i>	2						2				
<i>Marpphysa</i> nr. <i>sanguinea</i>	3						1			2	
<i>Mediomastus</i> sp.	95		4	3	2	69	7	1	1	5	3
<i>Megalomma pigmentum</i>	5	1								1	3
<i>Neanthes acuminata</i> Cmplx.	14		2				7				5
<i>Odontosyllis phosphorea</i>	4		1		3						
<i>Polydora cornuta</i>	7						5				2
<i>Polydora websteri</i>	6						3	2			1
<i>Prionospio heterobranchia</i>	8	3	1		1	3					
<i>Pseudopolydora paucibranchiata</i>	86	7			61	4	7	1	3	1	2
<i>Rhynchospius glutaeus</i>	35				1		1	11			22
<i>Scolelepis</i> sp.	4				2		1				1
<i>Scoletoma</i> sp. C	2		2								
<i>Scoloplos acmeceps</i>	25	1	6	4	5	6					3
<i>Scyphoproctus oculatus</i>	1						1				
<i>Spio</i> cf. <i>filicornis</i>	11	2		2	6			1			
<i>Streblospio benedicti</i>	264	87	1	8	35	1	33	21	30	5	43
Arthropoda											
<i>Acuminodeutopus heteruropus</i>	32	12	5	1	7	4					3
<i>Ampithoe</i> cf. <i>plumulosa</i>	1							1			
<i>Ampithoe</i> cf. <i>simulans</i>	2								2		
<i>Ampithoe</i> spp.	7	1			4	2					
<i>Bemlos macromanus</i>	1					1					
<i>Corophium</i> sp.	148	1			19	2	4	1	112	3	6
<i>Curnella</i> sp. D	1									1	
<i>Euphilomedes carcarodontia</i>	203	47	63	19	32	42					
<i>Grandidierella japonica</i>	61			1	23	16	5	2		14	
<i>Leptochelia dubia</i>	497	96	24	25	160	61	3	3	102	21	2
<i>Leptochelidae</i>	90	18	1	6	26	9		22	6	2	
<i>Mayerella acanthopoda</i>	59	11	1	11	5	14		1	5	11	
<i>Oxyurostylis pacifica</i>	7								1		6
<i>Paracerceis sculpta</i>	4						3	1			
<i>Parasterope bamesi</i>	17	7		1	4	5					
<i>Podocerus</i> spp.	1			1							
<i>Podocopid</i>	6	6									
<i>Pontogeneia rostrata</i>	1						1				
<i>Rudilemboides stenopropodus</i>	1		1								
<i>Rutiderma judayi</i>	19		2		10	7					
<i>Rutiderma rostratum</i>	1					1					
<i>Sinelobus stanfordi</i>	3	2									1
<i>Synaptotanais notabilis</i>	6					6					

(continued)

Table I2 (continued). Benthic invertebrate counts at intertidal stations in south San Diego Bay Survey SBPTE001 (Replicate A), July 2003.

Taxon	Total Count	IR1	IR2	IR3	IR4	IR5	IT1	IT2	IT3	IT4	IT5
Molluscs											
<i>Acteocina inculta</i>	21	3	18								
<i>Barleeria</i> sp./ <i>Assiminea californica</i>	4					4					
<i>Lyonsia californica</i>	2					2					
<i>Musculista senhousia</i>	16	1	3		7	4					1
<i>Nassarius tiarula</i>	2				1		1				
<i>Solen rostriformis</i>	2								1	1	
<i>Tellina meropsis</i>	28		8		2	12	1				5
Other Taxa											
<i>Anoplodactylus viridintestinalis</i>	1		1								
Nematoda	594	26	53	90	115	15	13	40	18	7	217
Nemertea unid.	2	1							1		
Oligochaeta	733	103	2	4	58	10	120	125	100	3	208
Phoronida unid.	6	4					1			1	
Total:	4,222	654	217	202	820	674	229	224	420	88	694

Table I3 (continued). Mean and standard deviation of benthic invertebrates at subtidal stations in south San Diego Bay, Survey SBPPTE002, August 2003.

Table I4. Mean and standard deviation of benthic invertebrates at intertidal stations in south San Diego Bay, Survey SBPPTE002, August 2003.

Taxon	Abun.	Total		IR1		IR2		IR3		IR4		IR5		IT1		IT2		IT3		IT4		IT5					
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.				
Annelida																											
<i>Armandia brevis</i>	13.0							5.0	5.0	2.0	3.5	0.7	0.6					1.0	1.0	2.7	2.9	1.7	1.2				
<i>Boccardiella hamata</i>	0.3																			0.3	0.6						
<i>Brania medioidentata</i>	13.7	2.7	2.9	8.3	13.6					1.0	1.7	1.7	1.5														
<i>Capitella capitata</i> cmplx.	52.3	1.7	1.5	4.0	3.6	1.0	1.7	10.0	9.5	11.3	6.8	1.3	1.5	3.0	1.7	0.7	1.2	1.0	1.0	18.3	12.3						
<i>Chone</i> sp.	0.7	0.3	0.6					0.3	0.6																		
<i>Chrysopetalum occidentale</i>	0.3																			0.3	0.6						
<i>Cirriformia moorei</i>	4.7																		2.0	2.0	0.3	0.6	1.0	0.0			
<i>Cirriformia</i> spp.	0.3																				0.3	0.6					
<i>Eteone aestuarina</i>	3.3	0.3	0.6																			1.0	1.0				
<i>Eteone californica</i>	0.3	0.3	0.6																								
<i>Exogone lourei</i>	2.7																										
<i>Exogone</i> sp. 1	60.7	3.0	2.6			2.7	1.2					2.7	2.5							1.0	1.0	5.3	0.6	48.7	57.6		
<i>Fabricinuda limnicola</i>	364.7	51.0	31.5	1.0	1.0	26.3	14.5	91.3	46.2	192.3	67.3			0.3	0.6	1.7	2.9			0.7	1.2						
<i>Glycera americana</i>	0.7							0.3	0.6			0.7	1.2														
<i>Harmothoainae</i>	0.3																										
<i>Leitoscolopios pugettensis</i>	1.0	0.7	0.6			0.3	0.6																				
<i>Marpysa</i> sp.	3.7																			2.3	2.5	0.7	0.6				
<i>Mediomastus</i> sp.	36.7	1.0		3.0	1.0	6.3	4.5					17.7	4.9	1.0					2.7	0.6	2.3	0.6	2.7	2.5			
<i>Megalomma pigmentum</i>	9.3	0.7	1.2			0.7	0.6															8.0	9.5				
<i>Neanthes acuminata</i> Cmplx.	8.3	0.3	0.6	0.3	0.6	1.0	1.0	0.3	0.6			0.3	0.6	1.3	1.2	1.0	1.0			2.0	1.7	0.7	1.2	3.7	2.5		
<i>Neanthes</i> sp.	2.7																										
<i>Odontosyllis phosphorea</i>	1.3	0.3	0.6			0.7	0.6					0.3	0.6	1.3	1.2	1.0	1.0										
<i>Paraonella platybranchia</i>	0.3	0.3	0.6																								
<i>Piromis</i> sp. SD1	0.3											0.3	0.6														
<i>Polydora cornuta</i>	1.7											1.0	1.7							0.3	0.6		0.3	0.6			
<i>Polydora</i> spp.	0.7																			0.7	0.6						
<i>Polydora websteri</i>	20.7											6.7	4.0	0.3	0.6	10.0	6.2	2.3	0.6	1.3	2.3						
<i>Polyopthalmus pictus</i>	0.3																				0.3	0.6					
<i>Prionospio heterobranchia</i>	3.3	0.3	0.6					1.7	1.2	1.3	1.2																
<i>Pseudopolydora paucibranchiata</i>	8.3	1.7	1.5			0.7	1.2	3.7	2.1	0.7	0.6	0.3	0.6	0.3	0.6					0.7	0.6	0.3	0.6				
<i>Rhynchospio glutaea</i>	18.0													0.3	0.6									17.7	12.9		
<i>Sabellidae</i>	0.7	0.7	1.2																								
<i>Scolelepis</i> sp.	2.3																		0.3	0.6			2.0	2.0			
<i>Scoletoma</i> sp. A	0.3	0.3	0.6																								
<i>Scoletoma</i> sp. C	0.7			0.3	0.6			0.3	0.6																		
<i>Scoloplos acmeceps</i>	25.3	4.7	3.8	2.3	0.6	3.7	3.5	7.7	2.9	3.3	1.5									1.7	1.2	2.0	1.7				
<i>Scyphoproctus oculatus</i>	0.3									0.3	0.6																
<i>Spioph. cf. filicornis</i>	2.3	0.7	1.2					0.7	0.6									1.0	1.0								
<i>Streblospio benedicti</i>	35.0	6.0	2.0					3.7	4.0			2.7	1.5	4.7	2.3	0.3	0.6	1.7	0.6	16.0	17.3						

(continued)

Table I4 (continued). Mean and standard deviation of benthic invertebrates at intertidal stations in south San Diego Bay, Survey SBPPTE002, August 2003.

Taxon	Total			IR1			IR2			IR3			IR4			IR5			IT1			IT2			IT3			IT4			IT5		
	Mean	Abun.	Mean	Mean	S.D.	Mean	Mean	S.D.	Mean	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.												
Mollusca																																	
<i>Acteocina inculta</i>	5.0																												0.7	1.2			
<i>Barleeria</i> sp./ <i>Assiminea californica</i>	38.3	0.3	0.6				2.3	2.5	12.3	13.7	23.3	27.1								2.0	3.5	2.3	4.0										
<i>Cecina</i> sp.	0.3						0.3	0.6																									
<i>Chione californiensis</i>	1.7																																
<i>Lyonsia californica</i>	1.7	0.3	0.6				0.7	1.2	0.3	0.6																		0.3	0.6				
<i>Musculista senhousia</i>	59.0	1.0	1.0	0.3	0.6	4.0	6.9	1.3	1.2	2.3	1.5	42.7	73.9								1.3	1.5	3.7	0.6			2.3	2.3					
<i>Solen rostriformis</i>	1.7			0.3	0.6	0.3	0.6	0.3	0.6	0.7	1.2																						
<i>Tagelus subteres</i>	13.3	0.7	1.2			0.3	0.6	1.3	0.6			2.0	2.6	3.0	2.6	0.7	1.2										5.3	8.4					
<i>Tellina meropsis</i>	34.7			4.3	0.6	0.3	0.6	1.3	1.5	5.0	2.6	9.0	4.0	3.3	4.9	2.7	2.3										8.7	14.2					
Other Taxa																																	
<i>Amphipholis squamata</i>	0.3						0.3	0.6																									
<i>Anoplodactylus viridintestinalis</i>	0.3																			0.3	0.6												
<i>Diadumene</i> spp.	2.0								0.7	0.6	1.3	2.3																					
<i>Edwardsia californica</i>	0.7								0.7	1.2																							
<i>Halcampidae</i> (juv.)	1.0																											1.0	1.7				
<i>Leptosynapta</i> spp.	0.3								0.3	0.6																							
<i>Limnactiniidae</i> sp. A	0.3																			0.3	0.6												
<i>Molgula</i> sp.	0.3																		0.3	0.6													
Nematoda	258.7	2.7	3.1	53.0	67.7	31.7	11.0	22.3	22.2	13.7	12.5	2.7	2.5	2.3	3.2	2.3	0.6	6.3	2.1	121.7	113.6												
Nemertea unid.	1.3																				0.3	0.6	1.0	1.0									
Oligochaeta	175.3	27.0	10.4	6.7	10.7	4.7	1.5	1.7	0.6	8.0	2.0	26.3	29.2	12.3	4.5	8.3	3.1	15.0	7.2	65.3	39.2								0.3	0.6			
Ophiuroid arm fragment	0.3																																
Phoronida unid.	26.0	4.7	5.0	2.0	1.7	0.3	0.6	0.7	0.6	1.0	1.0	7.7	10.0	5.0	1.0	0.3	0.6	4.0	2.0	0.3	0.6												
Rhabdocoela	0.3																												0.3	0.6			

Table I5. Benthic invertebrate counts at subtidal stations in south San Diego Bay, Survey SBPTE003 (Replicate A), September 2003.

Taxon	Total Count	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5
<u>Annelida</u>																						
Aoridae	2	1																1				
<i>Armandia brevis</i>	132	3	3	9	24	1	7	22	10	5		2	1	6		8	18	2	1	1	3	6
<i>Boccardiella hamata</i>	5							3										2				
<i>Brania mediodentata</i>	15	1						1	3			1					7	2				
<i>Capitella capitata</i>	355				4	5	18	181	7	6	6							80	23	15	7	3
Cirratulidae	37							37														
<i>Cirriformia moorei</i>	55							52			1								2			
<i>Cirriformia</i> spp.	79							79														
<i>Cossura pygodactylata</i>	5											3		2								
<i>Ctenodrilus serratus</i>	274						5	224										22	10	13		
<i>Diplocirrus</i> sp. SD1	10		7		1												2					
<i>Dipolydora socialis</i>	36							26										8	1	1		
<i>Dorvillea (Schistomeringsos)</i> sp.	6	1	5																			1
<i>Eteone aestuarina</i>	22	1	1		4	4	1					3		3			5		1	1		
<i>Exogone lourei</i>	51	4										4				9	31					
<i>Exogone</i> sp. 1	315	13	25	3	19	15	28	21		3	15	3	1			9	27	50	19	16	39	12
<i>Fabricinuda limnicola</i>	74		2		26	2			23							14	6					1
Harmothoinae	1															1						
<i>Leitoscolopios pugettensis</i>	134	1	20	22	6	6			9		5	25	7	6	22	4						1
<i>Marphysa</i> sp.	4							1								2	1					
<i>Mediomastus</i> sp.	941	64	59	12	43	19	16	34	51	34	16	32	58	11	23	173	267	16		6	3	4
<i>Megalomma pigmentum</i>	81	1	6	5	17	11	2		6	18			4	1		4				1	5	
<i>Neanthes acuminata</i> complex.	54	1	1				1	17	5		2	1		2		11	5	5			1	2
<i>Neanthes</i> sp.	16						4	2	5				1			3	1					
<i>Odontosyllis phosphorea</i>	39			1	1		1	5		1		1				3	11	12	1	1		1
<i>Piomis</i> sp.	5								3								2					
<i>Piomis</i> sp. SD1	5								1							1	1		2			
<i>Pista agassizi</i>	5	2							3													
<i>Prionospio heterobranchia</i>	27	3	3		4			2	3	1		8				1	2					
<i>Pseudopolydora paucibranchiata</i>	3			1					2													
<i>Rhynchospiopsis glutaea</i>	73		2	1	4	1				1		3				4	1	9	40	6	1	
<i>Scolelepis</i> sp.	29					3				3								7	12	3	1	
<i>Scoletema</i> sp. A	1											1										
<i>Scoletema</i> sp. B	1	1																				
<i>Scoletema</i> sp. C	129	42	10	9	2				1	1			5	5	8	9	7	30				
<i>Scoletema tetraura</i> complex.	3	3																				
<i>Scoloplos acmeceps</i>	3										1									2		
<i>Scyphoprocus oculatus</i>	17															7	10					
<i>Spio</i> cf. <i>filicornis</i>	2							1											1			
<i>Streblospio benedicti</i>	115						42	5			3							44	5		3	13
<i>Timarete</i> sp.	26										17										9	
<i>Typosyllis</i> sp.	23						22										1					

(continued)

Table I5 (continued). Benthic invertebrate counts at subtidal stations in south San Diego Bay, Survey SBPPTE003 (Replicate A), September 2003.

Taxon	Total Count	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5
Arthropoda																						
<i>Acuminodeutopus heterurus</i>	89	16	25	1	2				7			14	14	1	1	7	1					
<i>Amphideutopus oculatus</i>	9		2									7										
<i>Ampithoe cf. plumulosa</i>	1											1										
<i>Bemlos macromanus</i>	10								1			1						2	6			
<i>Caprella</i> spp.	1										1											
<i>Corophium</i> sp.	63								30	1	17							5	1	4	5	
<i>Cumella</i> sp. D	1									1												
<i>Elasmopus</i> spp.	4				1					3												
<i>Erichthonius brasiliensis</i>	13							1		2		4	1		1	5						
<i>Erichthonius</i> sp.	1								1													
<i>Euphilomedes carcarodonta</i>	8		3									1	1	1			2		2	2	1	
<i>Grandidierella japonica</i>	17								12									2	2	1		
<i>Heterophoxus</i> cf. <i>ellisi</i>	4	1								3												
<i>Heteroserolis carinata</i>	4	1										2					1					
<i>Leptochelia dubia</i>	163	2	2	2	3	1			4	1	3		2	1	15	93	4		15	15		
Leptocheliidae	22	1			2					1			2	2	2	8		4	4	2		
<i>Mayerella acanthopoda</i>	348	14	7	69	5		3	2		97	15	3	5	5	8	31	4	1	1	38	40	
Melitidae	9															9						
<i>Monoculodes hartmanae</i>	4											4										
<i>Oxyurostylis pacifica</i>	6		4									2										
<i>Paracerceis sculpta</i>	9		2						2	4		1										
<i>Parametopella</i> cf. <i>ninis</i>	5											5										
<i>Paranthura elegans</i>	2									1		1										
<i>Parasterope bamesi</i>	19	2								5	3	2				1	6					
<i>Podocerus</i> spp.	29		1	1				5			21				1							
Podocopid	4					1			2			1										
<i>Rudilemboides stenopropodus</i>	115	20		1			1					11		2		8	72				1	
<i>Rutiderma judayi</i>	59				3	1			24		10	2		1		7	11					
<i>Rutiderma</i> sp.	15								13			2										
<i>Synchelidium rectipalmum</i>	1	1																				

(continued)

Table I5 (continued). Benthic invertebrate counts at subtidal stations in south San Diego Bay, Survey SBPPTE003 (Replicate A), September 2003.

Taxon	Total Count	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5
Molluscs																						
<i>Acteocina inculta</i>	39					1		1	8	16	10		2	1								
<i>Barleeria sp./Assiminea californica</i>	48							4	37		3		1	1				2	1			
<i>Cecina</i> sp.	1										1											
<i>Crucibulum spinosum</i>	54										1	52										1
<i>Lyonsia californica</i>	15			1	1	1	1			3	1	1	2	1			2				1	
<i>Macoma nasuta</i>	1							1														
<i>Musculista senhousia</i>	424	51	2	1		2	1	295		1	23				6		1	31	7	2		1
<i>Nassarius tiarula</i>	1			1																		
<i>Solen rostriformis</i>	1		1																			
<i>Tagelus subteres</i>	11									3	3								2	1	2	
<i>Tellina meropsis</i>	380	3	12	11	10	15	15	52	3	17	18	8	30	10	4	76	40	27	10	17	2	
<i>Theora lubrica</i>	11	2	3						1			2				2	1					
<i>Thracia curta</i>	3		3																			
Other Taxa																						
<i>Amphipolis squamata</i>	23		1		1					1	3	8	1			1	1	7				
Amphiuridae (juv.)	4										1	1	1				1	1	1			
<i>Anoplodactylus</i> sp.	1								1													
<i>Anoplodactylus viridintestinalis</i>	1								1													
Aplousobranchia	1																			1		
<i>Diadumene</i> spp.	15	1							2			8						2			2	
<i>Edwardsia californica</i>	2		1													1						
<i>Harmothoe hirsuta</i>	2								1									1				
<i>Listriella</i> sp.	1	1																				
Nematoda	6,245	131	148	6		6		4,762	17	38	25			2	1	162	528	287	2	2	114	14
Nemertea unid.	13	1			2		1	3	1			2					2			1		
Oligochaeta	1,140	3	12	8	15	5	101	241	69	9	13	15	3			81	23	387	5	2	113	35
<i>Ophioctis simplex</i>	1						1										1		5			
<i>Ophyotrocha</i> sp.	20							13	1									1		36	18	3
Phoronida unid.	209	1	2	6	1	10	1	1		55	42				1		2	36	18	3	22	8
Porifera unid. a	3	1		1				1														
<i>Pseudoceros</i> sp.	1		1																			
<i>Vitrinella</i> sp.	1										1											
Total:	12,917	395	372	176	201	110	250	6,171	341	328	338	149	161	68	54	665	1,303	1,028	159	76	393	179

Table I6. Benthic invertebrate counts at intertidal stations in south San Diego Bay Survey SBPPTE003 (Replicate A), September 2003.

Taxon	Total Count	IR1	IR2	IR3	IR4	IR5	IT1	IT2	IT3	IT4	IT5
<u>Annelida</u>											
Aoridae	4					4					
<i>Armandia brevis</i>	5	2			2					1	
<i>Brania mediodentata</i>	15	3	10			2					
<i>Capitella capitata</i>	29	1		7	10	6	1	2	1		1
Cirratulidae	1		1								
<i>Cirriformia moorei</i>	8								8		
<i>Cirriformia</i> spp.	1		1								
<i>Dipolydora socialis</i>	26						1	6	17	1	1
<i>Eteone aestuarina</i>	3	1	1		1						
<i>Exogone</i> sp. 1	6	2	3						1		
<i>Fabricinuda limnicola</i>	265	69	3	1	9	182		1			
<i>Marpysa</i> nr. <i>sanguinea</i>	9						2	1	4	2	
<i>Marpysa</i> sp.	4							1	3		
<i>Mediomastus</i> sp.	46		2	2		38	2		2		
<i>Megalomma pigmentum</i>	2								1		1
<i>Neanthes acuminata</i> complex.	10	9			1						
<i>Neanthes</i> sp.	3							2	1		
<i>Odontosyllis phosphorea</i>	1				1						
<i>Prionospio heterobranchia</i>	6				2	4					
<i>Pseudopolydora paucibranchiata</i>	1									1	
<i>Scolelepis</i> sp.	1									1	
<i>Scoletoma</i> sp. A	1		1								
<i>Scoloplos acmeceps</i>	23	10		2	5	4					2
<i>Streblospio benedicti</i>	6	2						1	1		2
<u>Arthropoda</u>											
<i>Acuminodeutopus heteruropus</i>	49	5	20			24					
Amphipoda unid.	10					7				2	1
<i>Ampithoe</i> cf. <i>plumulosa</i>	1			1							
<i>Corophium</i> sp.	56	35	4	2			2	1	2		10
<i>Erichthonius brasiliensis</i>	3					3					
<i>Euphilomedes carcarodonta</i>	109	13	29	2	8	57					
<i>Grandidierella japonica</i>	55	3	6		2	18	1		25		
<i>Hyale</i> sp.	1	1									
<i>Leptochelia dubia</i>	752	154	263	5	243	21				1	65
Leptocheliidae	71	20	35		11	2					3
<i>Mayerella acanthopoda</i>	22	8	4		1	9					
<i>Paracerceis sculpta</i>	5	2	1	1	1						
<i>Paranthuria elegans</i>	1	1									
<i>Parasterope bamesi</i>	87	25		1	5	56					
<i>Podocerus</i> spp.	14	13		1							
<i>Rudilemboides stenopropodus</i>	1	1									
<i>Rutiderma judayi</i>	36	1	3		7	25					
<i>Rutiderma lomae</i>	6				4	2					
<i>Rutiderma rostratum</i>	3				3						
<i>Rutiderma</i> sp.	6					6					

(continued)

Table I6 (continued). Benthic invertebrate counts at intertidal stations in south San Diego Bay Survey SBPPTE003 (Replicate A) September 2003.

Taxon	Total Count	IR1	IR2	IR3	IR4	IR5	IT1	IT2	IT3	IT4	IT5
Molluscs											
<i>Acteocina inculta</i>	187					7	136	6	20	10	8
<i>Barleeria</i> sp./ <i>Assiminea californica</i>	25				25						
<i>Caecum californicum</i>	3			2					1		
<i>Cecina</i> sp.	1								1		
<i>Chione californiensis</i>	8						2		3	2	1
<i>Musculista senhousia</i>	16	1	1		3	1				10	
<i>Solen rostriformis</i>	1				1						
<i>Tagelus subteres</i>	41	7	2	1	1		15	6	5		4
<i>Tellina meropsis</i>	73	16	2	2	10	4	11	6	8	9	5
Other Taxa											
<i>Diadumene</i> spp.	3									3	
Nematoda	125	16	60	16	10	12	3	4	1	1	2
Oligochaeta	96	27	34	1		4	2	3	20		5
Phoronida unid.	17	2			1	1		13			
Total:	2,360	450	486	47	367	499	178	51	126	43	113

Appendix J

Fish Monitoring Data

Table J1. List of Fish Species Observed in SBPP Discharge Channel (Summer 2003).

Common Name	Scientific Name	Sampling 1 (27Aug03)	Sampling 2 (12Sept03)	Sampling 3 (29Sept03)
Bat ray	<i>Myliobatis californica</i>		X	X
Round stingray	<i>Urolophus halleri</i>	X	X	X
California butterfly ray	<i>Gymnura marmorata</i>			X
Bonefish	<i>Albula vulpes</i>			X
Slough anchovy	<i>Anchoa delicatissima</i>	X	X	X
Deepbody anchovy	<i>Anchoa compressa</i>	X	X	X
California needlefish	<i>Strongylura exilis</i>			
California halfbeak	<i>Hyporhamphus rosae</i>	X	X	X
California killifish	<i>Fundulus parvipinnis</i>	X	X	
Topsmelt	<i>Atherinops affinis</i>	X	X	X
Bay pipefish	<i>Syngnathus leptorhynchus</i>	X	X	X
Barred pipefish	<i>Syngnathus auliscus</i>	X	X	
Spotted sand bass	<i>Paralabrax maculatofasciatus</i>			X
Queenfish	<i>Seriphus politus</i>	X	X	X
Shortfin corvina	<i>Cynoscion parvipinnis</i>	X		
Striped mullet	<i>Mugil cephalus</i>	X		
Yellowfin goby	<i>Acanthogobius flavimanus</i>	X	X	X
Cheekspot goby	<i>Ilypnus gilberti</i>	X	X	X
Arrow goby	<i>Clevelandia ios</i>	X	X	X
Shadow goby	<i>Quietula y-caudia</i>		X	
Diamond turbot	<i>Hypsopsetta guttulata</i>	X	X	X
SPECIES COUNT PER SAMPLING INTERVAL		15	15	15
ACCUMULATED SPECIES COUNT		15	17	20

Table J2. List of Fish Species Observed in Sweetwater River (Summer 2003).

Common Name	Scientific Name	Sampling 1 (27Aug03)	Sampling 2 (12Sept03)	Sampling 3 (29Sept03)
Bat ray	<i>Myliobatis californica</i>			
Round stingray	<i>Urolophus halleri</i>	X	X	X
California butterfly ray	<i>Gymnura marmorata</i>			
Bonefish	<i>Albula vulpes</i>			
Slough anchovy	<i>Anchoa delicatissima</i>	X	X	X
Deepbody anchovy	<i>Anchoa compressa</i>		X	
California needlefish	<i>Strongylura exilis</i>		X	
California halfbeak	<i>Hyporhamphus rosae</i>	X	X	X
California killifish	<i>Fundulus parvipinnis</i>	X		
Topsmelt	<i>Atherinops affinis</i>	X	X	X
Bay pipefish	<i>Syngnathus leptorhynchus</i>		X	X
Barred pipefish	<i>Syngnathus auliscus</i>	X		
Spotted sand bass	<i>Paralabrax maculatofasciatus</i>	X	X	X
Queenfish	<i>Seriphus politus</i>			
Shortfin corvina	<i>Cynoscion parvipinnis</i>	X	X	
Striped mullet	<i>Mugil cephalus</i>			
Yellowfin goby	<i>Acanthogobius flavimanus</i>	X		X
Cheekspot goby	<i>Ilypnus gilberti</i>	X		
Arrow goby	<i>Clevelandia ios</i>	X		
Shadow goby	<i>Quietula y-caudia</i>			
Diamond turbot	<i>Hypsopsetta guttulata</i>			
SPECIES COUNT PER SAMPLING INTERVAL		11	9	7
ACCUMULATED SPECIES COUNT		11	14	14

Table J3. List of Fish Species Observed in Long Term Studies at Reference Sites

Common Name	Scientific Name	SBPP Discharge Channel '97-'00*	South San Diego Bay '94-'97 **	Aqua Hedionda '94-'95***	Anaheim Bay '90-'95†	Batiquitos Lagoon '97-'01 ‡‡
Gray smoothhound	<i>Mustelus californicus</i>	X	X	X	X	X
Brown smoothhound	<i>Mustelus henlei</i>				X	
Leopard shark	<i>Triakis semifasciata</i>				X	
Shovelnose guitarfish	<i>Rhinobatos productus</i>	X				X
Bat ray	<i>Myliobatis californica</i>	X	X			X
Round stingray	<i>Urolophus halleri</i>	X	X		X	X
California butterfly ray	<i>Gymnura marmorata</i>	X		X		X
Diamond stingray	<i>Dasyatis dipterura</i>	X				
Bonefish	<i>Albula vulpes</i>	X	X			X
Pacific worm eel	<i>Myrophis vafer</i>					X
Threadfin shad	<i>Dorosoma petenense</i>	X				X
Pacific herring	<i>Clupea harengus</i>				X	X
Pacific sardine	<i>Sardinops sagax</i>	X	X		X	X
Northern anchovy	<i>Engraulis mordax</i>	X	X	X	X	X
Slough anchovy	<i>Anchoa delicatissima</i>	X	X		X	X
Deepbody anchovy	<i>Anchoa compressa</i>	X	X	X	X	X
California lizardfish	<i>Synodus luciocephalus</i>					
Specklefin midshipman	<i>Porichthys myriaster</i>	X	X		X	
Plainfin midshipman	<i>Porichthys notatus</i>					
California needlefish	<i>Strongylura exilis</i>	X	X			X
California halfbeak	<i>Hyporhamphus rosae</i>	X	X			
California killifish	<i>Fundulus parvipinnis</i>	X	X	X	X	X
Topsmelt	<i>Atherinops affinis</i>	X	X	X	X	X
Jacksmelt	<i>Atherinopsis californiensis</i>					
California grunion	<i>Lauresthes tenuis</i>				X	X
Snubnose pipefish	<i>Bryx arctos</i>			X		
Bay pipefish	<i>Syngnathus leptorhynchus</i>	X	X		X	X
Barred pipefish	<i>Syngnathus aulicus</i>	X	X	X	X	X
Barcheek pipefish	<i>Syngnathus exilis</i>					
Kelp pipefish	<i>Syngnathus californiensis</i>			X		
Pacific seahorse	<i>Hippocampus ingens</i>					
Spotted scorpionfish	<i>Scorpaena guttata</i>			X		
Staghorn sculpin	<i>Leptocottus armatus</i>	X	X	X	X	X
Spotted sand bass	<i>Paralabrax maculatofasciatus</i>	X	X		X	X
Barred sand bass	<i>Paralabrax nebulifer</i>	X	X	X		X
Kelp bass	<i>Paralabrax clathratus</i>			X		
Salema	<i>Xenistius californiensis</i>			X		X
Sargo	<i>Anisotremus davidsonii</i>				X	X
Bigscale goatfish	<i>Pseudupeneus grandisquamis</i>	X				
Lookdown	<i>Selene vomer</i>	X				
Queenfish	<i>Seriphus politus</i>			X	X	X
White seabass	<i>Atractoscion nobilis</i>	X	X		X	X
California corbina	<i>Menticirrhus undulatus</i>					X
White croaker	<i>Cynoglossus lineatus</i>				X	
Spotfin croaker	<i>Roncador stearnsii</i>	X	X			X

(Table continued)

Table J3 (continued). List of Fish Species Observed in Long Term Studies at Reference Sites

Yellowfin croaker	<i>Umbrina roncador</i>	X	X		X	X
Black croaker	<i>Cheilotrema saturnum</i>		X		X	
Shortfin corvina	<i>Cynoscion parvipinnis</i>	X				
Shiner surfperch	<i>Cymatogaster aggregata</i>	X	X	X		X
Striped mullet	<i>Mugil cephalus</i>	X	X		X	X
California barracuda	<i>Sphyraena argentea</i>				X	X
Blue bobo	<i>Polydactylus approximans</i>	X				
Bay blenny	<i>Hypsoblennius gentilis</i>		X			
Spotted kelpfish	<i>Gibbonsia eligans</i>		X			
Giant kelpfish	<i>Heterostichus rostratus</i>		X		X	
Longtail goby	<i>Gobionellus sagittula</i>	X				X
Lonjaw mudsucker	<i>Gillichthys mirabilis</i>	X	X	X	X	X
Bay goby	<i>Lepidogobius lepidus</i>					X
Yellowfin goby	<i>Acanthogobius flavimanus</i>	X	X	X	X	X
Checkspot goby	<i>Hypnus giberti</i>	X	X		X	X
Arrow goby	<i>Clevelandia ios</i>	X	X	X	X	X
Shadow goby	<i>Quietula y-caudia</i>	X	X	X	X	X
California halibut	<i>Paralichthys californicus</i>	X	X	X	X	X
Bigmouth sole	<i>Hippoglossina stromata</i>				X	
Fantail sole	<i>Xypterus hololepis</i>		X			
Spotted turbot	<i>Pleuronichthys ritteri</i>		X			
Diamond turbot	<i>Hypsopsetta guttulata</i>	X	X	X	X	X
TOTAL SPECIES COUNT		38	46	17	33	41

* - SBPP Cooling Water Discharge Channel Fish Community Characterization Study, Merkel & Associates 2000

** - Station 4 (South) from Fisheries Inventory and Utilization of San Diego Bay, 3rd Annual Report, CSU Northridge 1997

***- East Inner Lagoon Station, from 1994 and 1995 Field Survey Report of the Ecological Resources of Agua Hedionda Lagoon, MEC Anaytical Systems 1995

+ - Case Road Station, from Anaheim Bay Biological Monitoring, MEC Anaytical Systems 1995

++ - Station 1 (east lagoon) from Long Term Monitoring and Pilot Vegetation for the Batiquitos Lagoon Enhancement Project, Merkel & Associates 2001

Table J4. Number of Species, Density, and Biomass, by replicate for purse seine and large seine combined

a) Number of Species

Period	Station	Sampling Replicate		
		Inner	Middle	Outer
Sampling 1 (27Aug03)	SPBB Discharge	8	14	11
	Sweetwater River	7	5	8
Sampling 2 (12Sept 03)	SPBB Discharge	7	13	9
	Sweetwater River	7	5	6
Sampling 3 (29Sept03)	SPBB Discharge	10	11	8
	Sweetwater River	6	5	4

b) Density (individuals/m²)

Period	Station	Sampling Replicate		
		Inner	Middle	Outer
Sampling 1 (27Aug03)	SPBB Discharge	6.1	7.6	7.4
	Sweetwater River	1.3	0.5	0.6
Sampling 2 (12Sept 03)	SPBB Discharge	2.6	1.4	2.3
	Sweetwater River	0.9	0.6	0.8
Sampling 3 (29Sept03)	SPBB Discharge	7.9	8.4	1.5
	Sweetwater River	0.6	0.3	0.3

c) Biomass (g/m²)

Period	Station	Sampling Replicate		
		Inner	Middle	Outer
Sampling 1 (27Aug03)	SPBB Discharge	3.8	4	1.9
	Sweetwater River	4	1.1	3.8
Sampling 2 (12Sept 03)	SPBB Discharge	1.3	6.4	0.8
	Sweetwater River	4	2.7	4.8
Sampling 3 (29Sept03)	SPBB Discharge	50.4	5.6	0.5
	Sweetwater River	2.2	0.5	1.5